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# POPULAR MECHANICS

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# Thrill to Guaranteed World-Wide HIGH FIDELITY Performance with This Amazing New 1935 MIDWEST 16-TUBE ALL-WAVE Radio!

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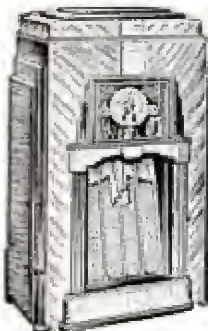
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### Listeners to Foreign Reception

Listeners to Foreign Reception: We have heard the few countries with your Midwest. Have received **Madras**, **Hyderabad**, **London**, **Paris**, **Vienna**, **Moscow**, **Madrid**, **New York**, **Shanghai**, **Tokyo** and also South American transmitters. **Marquise B.**, Bucharest, **Aperito**, 80, Plaza San Martin, 171.



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Provides Faster Pick-Up—More Power—  
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the Carburetor Control  
that "BREATHES"

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### New—Automatic—Nothing Like It!

The self-starter—four wheel brakes—knee action—streamlining . . . and now VACU-MATIC! The greatest motor improvement of recent years! With it, engineers have achieved a practical means of balancing air and gasoline automatically for all speeds. Vacu-matic is *entirely different!* It is AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles—no carburetor adjustments necessary. Just put it on and forget it! Sharply cuts fuel wastes, saves dollars in gas costs, reduces carbon and gives your engine new pep, greater power and longer life.

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VACU-MATIC is constructed of six parts, assembled and welded into one unit, correctly adjusted and sealed at the factory. Nothing to regulate. Any motorist can attach VACU-MATIC in ten minutes. Once in, its only reminder is the surge of instant power and speed it gives to the motor and the savings it affords your pocketbook.

The VACU-MATIC Co.,

Wauwatosa, Wis.

# SAVES GAS!

#### CHRYSLER

Have tried the Vacu-matic and it sure is fine. Better pick-up with a 30% gas saving. — John C. Martin, Pa.

#### PLYMOUTH

I am amazed at Vacu-matic performance. It's giving me 5 more miles per gallon. — Walter Zielinski, Ill.

#### FRANKLIN

With Vacu-matic I have increased my mileage from 10.1 to 14.2 miles per gallon. I figure I save over \$75.00 a year in gasoline. — R. K. Radtke, Wis.

#### SAVES \$180 A YEAR

On my Plymouth 6 I obtained an average of 22 miles per gallon, an increase of 7 miles. This means a saving of \$15 a month or \$180 a year. — F. S. Peck, Calif.

#### ALL WELL PLEASED

Enclosed find order for 12 more. Everyone I have sold is giving from 4 to 6 more miles per gallon. I have 3 more orders for V8 Ford. Every body is well pleased. — J. O. Carll, Texas.

#### NASH

On my Advanced 6 Nash gained 17 1/2% in mileage. The car will idle down to 3 miles an hour and then take gas without a complaint. — J. Showalter, Mo.

#### DODGE

Just completed 2310 miles on 92 gallons in my 1933 Dodge 6. This figures 25 miles while before I averaged only 20 miles per gal. on trips. — Al Fruzyna, Calif.

#### OLDSMOBILE

I am well pleased with Vacu-matic on our Oldsmobile. A test proved it to give 18 miles per gal. before we considered 13 good. — Arthur Williams, N. Y.

Above are just a few of the many unsolicited letters received from Vacu-matic users.

#### V-8 FORD

I installed both Vacu-matics and they work excellent. On my own V8 Ford I notice wonderful performance in pickup, get-away and gas saving. — Burt Burnett, Mich.

#### BUICK

Everything you claim about Vacu-matic is true. I now get 20 miles to the gallon. Before I was only averaging 15 1/2 miles. — C. Constantino, Fla.

#### CHEVROLET

Please send me a Vacu-matic for a Model A. The mileage on my 1933 Chevrolet jumped from 18 to 22 miles per gal. with Vacu-matic. — Paul P. Haas, Mass.

#### MODEL A FORD

Have been using the Vacu-matic for a month. I used to get 20 to 22 miles per gal. Now I get 30 to 33 miles. It is amazing the difference it makes. — James W. Barr, Canada.

### Guaranteed Gas Savings

The VACU-MATIC proves itself on every car. It is guaranteed to give worth-while gas savings, quicker pick-up, and more power or it costs you nothing. "On a test I gained an average of 4 miles on a gallon," writes Alex Wertz. "Vacu-matic is the best I have ever tried." Clarence Rutzin—"I have tried the Vacu-matic on several tests and find that I get between 5 and 6 miles per gallon increase, have more mileage, have greater pickup."

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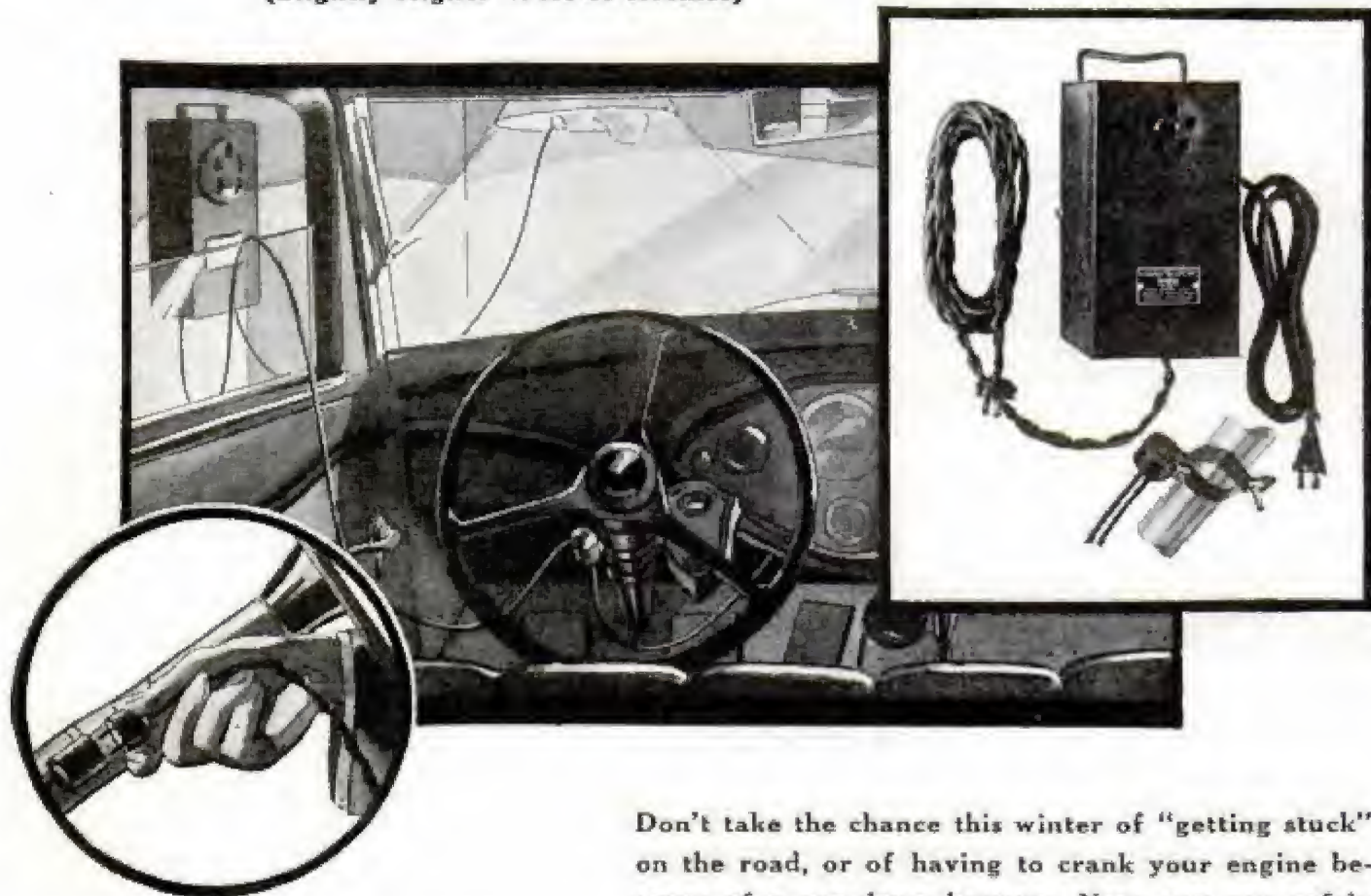
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# Popular Mechanics Magazine

H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher

January, 1935

Vol. 63, No. 1

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## Looking Ahead with "Boss Ket"

**W**HAT the world needs most of all today is a whole crop of new inventions. In standardizing production, we have, unfortunately, standardized ideas. We've made over and over again the same old things when we should be constantly making new things—endlessly changing. These are the words of Charles F. Kettering—"Boss Ket" to his boys—who sees great things ahead for today's youth in tomorrow's America. Watch for Frazier Hunt's interview, in the February issue, with the head of the experimental laboratories of the General Motors company.

## Next Month

**E**ACH 1935 automobile represents the dreams, ideals, sweat and teamwork of a host of designers, sculptors, engineers, steel workers, parts manufacturers and factory officials. Eight pages of pictures in color next month depict the birth of an automobile, and a story explains the processes.

## "Hams" to the Rescue

**A**N earthquake destroys a metropolis, a tornado rips through a populous countryside, a raging fire threatens to wipe out a city. The outside world has brief warning of the catastrophe. Then comes silence. Ordinary means of communications have broken down. When such disasters strike, radio amateurs go into action and are often the means of saving lives and property. There are 60,000 of these "hams" on the short waves today. Read of their heroic work in the February issue.

## Death Cheaters

**B**OB ROSE, motion picture stunt man, has made 560 parachute jumps and changed planes sixty times in midair. He has dived from heights above ninety feet 150 times, he has been in 180 automobile wrecks and he has raced horses over cliffs sixty-five times. In the February issue this veteran stunt man relates his experiences and gives his recipe for cheating death while performing such feats.

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# GENUINE PYROIL

## protects against winter damage



"IN TEMPERATURES OF 8° BELOW ZERO TO 110° ABOVE, ALL WITHIN 48 HOURS, PYROIL INSURED ME OF MOTOR SAFETY," SAYS BOB MCKENZIE, TRANSCONTINENTAL ROAD CHAMPION. (At left)

In cold weather, Pyroil protected motors start easily, save battery drain and escape starting damage. This is because Pyroil forms a glossy, slippery, self-lubricating surface on all frictional parts, which surface safeguards the metal until "frozen" oils and grease circulate properly.

Bob McKenzie, who holds many championships for cross country endurance driving, says: "I have broken records under all conditions and have used Pyroil in the crankcase, the transmission and differential. Pyroil will give the winter motorist better performance, easier starting and motor safety."

Use Pyroil regularly this winter. Simply add by the ounce to each filling and addition of gas, oil and grease. Saves far more than its cost. Sold the world over at service stations, garages and dealers. Mail coupon for full text of Bob McKenzie's statement and tests, using Pyroil. Manufactured and Guaranteed by **PYROIL COMPANY, W. V. Kidder, Pres., 51 Pyroil Bldg., LaCrosse, Wis., U. S. A.**

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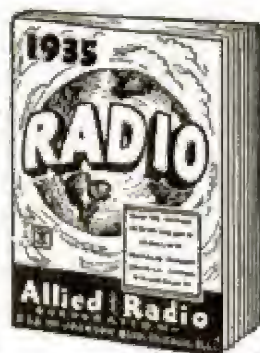
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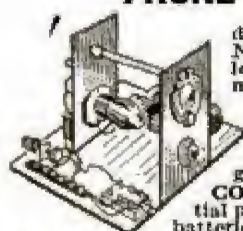
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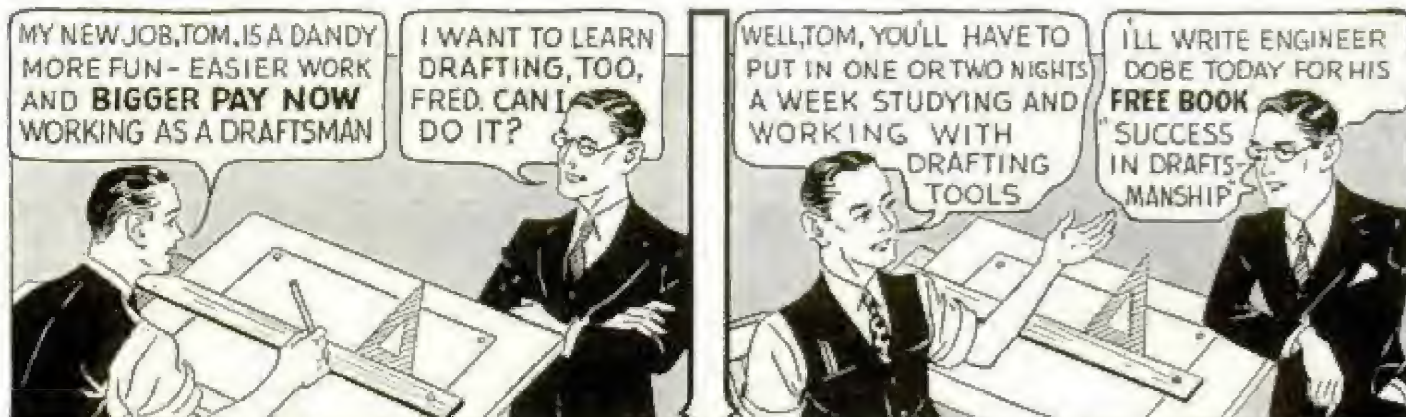
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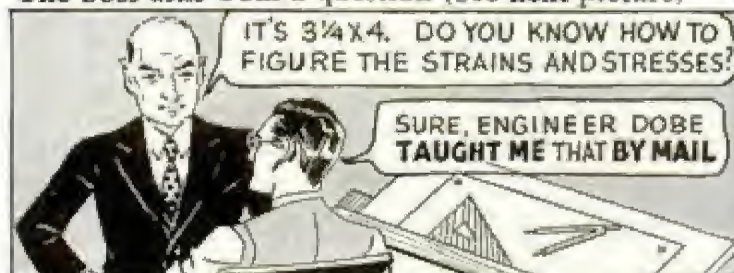


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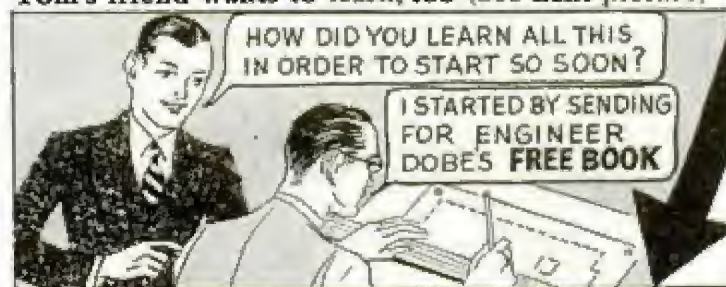
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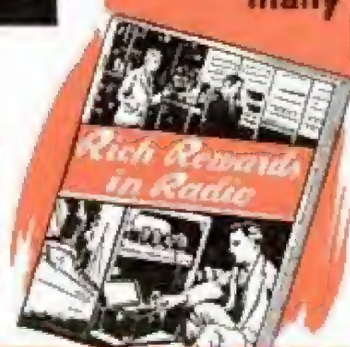
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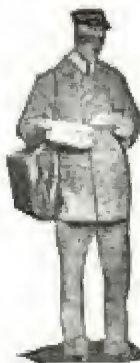
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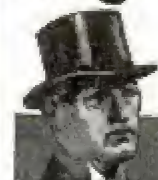
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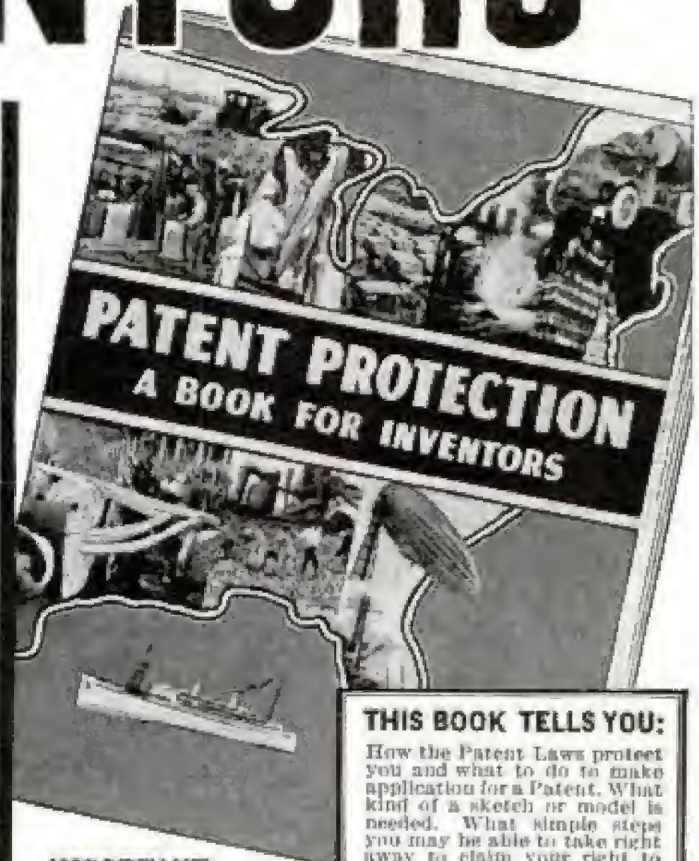
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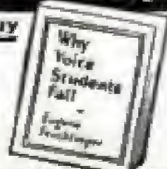


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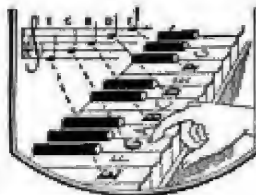
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**THREE** Beautiful enlargements from your negatives 25c. Imperial Film Service, Unionville, Mo.

**FILMS Developed** any size 25c coin including two enlargements. Century Photo Service, Box 829, La Crosse, Wis.

**TWO Crystal** stiple enlargements with each roll 25c. Photoshop, 4112-8 Oriole, Chicago.

**ENLARGEMENTS 4x6, Five for 25c, 5x7 three for 25c, 8x10 three for 35c.** Special hand colored easel mounted 4x6 enlargement 25c. Enlargers, 1652-8 North Western, Chicago.

**HAND Colored** enlargement with each roll 25c. 40 reprints 50c. Colorgraph-8, Dunling Station, Chicago.

**MAKE Money** in photography. Learn quickly at home. Spare or full time. New plan. Nothing like it. Experience unnecessary. American School of Photography, Dept. 3432, 3601 Michigan Avenue, Chicago.

**ROLL Developed, 8 prints, oil painted enlargement, 25c.** Prompt service. Work guaranteed. Individual attention to each picture. Janesville Film Service, C15, Janesville, Wisconsin.

**16 BEAUTIFUL** Gloss prints and two enlargement coupons only 25c. Imperial Film Service, Unionville, Mo.

**SUPERIOR 5x7 Enlargements,** send negative, 15c coin; two, 25c. Low prices; highest quality. J. Bratt, 1475-U Grand Concourse, New York.

**DEVELOP** And print snapshots yourself. See advertisement on Winner Photo-Set, page 142A.

**COLOR** Enlargement with each film developed—a professional enlargement painted in oils and eight Gloss-tone prints, deluxe finish, guaranteed not to fade, 25c. Super quality—Speedy service—Satisfaction or money refunded. LaCrosse Film Company, Dept. 19, LaCrosse, Wis.

**ROLLS Developed.** Two beautiful double-weight professional enlargements and 8 guaranteed Never Fade Perfect Tone prints, 25c coin. Rays Photo Service, LaCrosse, Wisconsin.

**TRIAL Offer.** Roll developed and 8 prints 25c. Prints 3c each. Beautiful 10-inch enlargement 25c. Photo Christmas cards or photo calendars 10c each, 14 for \$1.00. Young Photo Service, 405 Bertha St., Albany, N. Y.

**KODAK Pictures** enlarged, 5x7 10c, 3 for 25c. Send negative film. Stanley Studio, Des Moines, Iowa.

**20 REPRINTS 25c.** Films developed, two prints each negative, 25c. Skrudland, 4118-8 Overhill, Chicago.

**FILMS Developed 5c per roll; prints 3c each.** Ask for special bargain list. Keanoke Photo Finishing Company, 161 Bell Ave., Buanoke, Va.

**YOUR Favorite kodak pictures** enlarged, size 5x7, 10c. Three for quarter, coin. Send best negatives (film) today. Address Darmer Photo Lab., Enlarging Dept. 9, Des Moines, Iowa.

**INCOME** From your camera instead of expense. Low cost home course teaches you to make photographs for magazines, newspapers, advertisers. Tremendous demand. Earn good money wherever you live. Free book. Universal Photographers, Dept. 104, 10 West 33rd St., New York.

**ROLLS, Developed, printed, 25c.** Mail your films to the biggest and best. Rolls developed and 8 good prints guaranteed plus 8x10 inch enlargement coupon only 25c. Reprints any size 3c each. Geppert Studios, Dept. 130, Des Moines, Iowa.

**HAVE You a camera?** Send ten cents for recent number of our big magazine, showing how to make better pictures and earn money. American Photography, 116 Camera House, Boston, 17, Mass.

#### MOTION PICTURES AND SOUND EQUIPMENT

**LEARN** The motion picture theatre business. Big opportunities for trained men. Catalog T free. Theatre Institute, Elmhurst, New York.

**NEW 100 Ft., 16mm. subjects \$2.25, \$2.50, \$2.95.** Projector, camera bargains. Film rental library. Dime brings catalogue, two "and" titles. Eastin Films, Dept. 29, Galesburg, Ill.

**REELS \$1.10, 500 Ft. 75c.** Jersey Films, 2075 Richmond, Lakewood, Ohio.

**8MM OR 16MM.** Movie cameras and projectors. Cash or terms. Elder, Dept. B-7, Chelsea, Mass.

**16MM FILMS—Art 10c foot.** Mickey-Mouse, Chaplin, Silly Symphony 5c foot. Big features rented anywhere \$5.00. Lists. Thousand feet 35mm \$1.00. Features \$7.50. Projectors, cameras \$5.00 up. Waldo Films, Box 524, Cincinnati.

**35MM FILMS.** Holiday bargains. List. Lakeshore Film Service, Michigan City, Ind.

**CHRISTMAS Bargains—16mm—8mm.** Listings stamp. Box 2133, Paterson, N. J.

**SOUND, Silent, projector, cameras, parts, accessories, film, new, used at bargain prices.** National film library trades accepted, catalogue. Mogull Bros., 1944-J Boston Road, New York City.

**500-WATT 16MM Projector** outfits, case, screen, film, \$110.00 value only \$79.50 new. Films 35c up. Art sample 25c. Free 16mm, 8mm bargain lists. Home Movies, Box 92, Easton, Penna.

**LOWEST Prices** for all kinds movie film and equipment. Free developing. Send stamp for price list. Home Movies Co., 22 E. Vanburen, Chicago.

**UNUSUAL 35mm Lists, samples, 3c.** Kneeland, 25 Sterling, Medford, Mass.

**WORLD'S Greatest "Passion Play" 16 MM.** (new) 5 reels. Rent or purchase. Write Heinemann Film Co., 37 Church Street, Boston, Mass.

**EXCHANGE** Library sound-on-film features, new, interesting; also 8mm and 16mm silent films of every variety. Harry Mendelwager, 182 W. 49 St., Bayonne, N. J.

**1000 FEET 35mm 75c.** Projectors. Features. Savarese, Woodliff Lake, N. J.

**35-MM FILMS.** Projectors. Stamp for lists. Box No. 6, Rosedale, Kans.

**100 FEET 35mm 27c; odd reels 80c** plus postage. 6 reel features \$6.00. Bargain lists 3c. Hoffman Film Service, 57 Broad, Albany, New York.

**BASS Offers** for a limited time brand new 100 ft. Stewart-Warner 16mm Cine camera, complete with case, F3.5 lens, worth \$50.00, at \$18.50 each. Hundreds of other bargains in Bass Bargaingram No. 212 mailed on request. Write to Value Headquarters. Bass Camera Company, 179 W. Madison St., Chicago, Ill.

**DEVELOP** And print your own movies, instructions \$1.00. Millo, 620 Myrtle Ave., Brooklyn, N. Y.

#### TELEGRAPHY

**FREE—Radio and Morse telegraphy book.** Learn code in short time. New easy method. Fisher Electric Company, 3301 Riverside Avenue, Cleveland, Ohio.

#### BUSINESS OPPORTUNITIES

**PLASTEX Industries** offers industrious men an opportunity to start a business of their own, manufacturing art goods, novelties, souvenirs, etc., in Plastex and marble imitation. 5c material makes \$1 articles. Rubber moulds furnished for speed production. Small investment brings big returns. You are just in time for big Christmas business now starting. Write for interesting booklet mailed free. Plastex Industries, Dept. A, 1085 Washington Ave., New York.

**(S.R.C.) Synthetic rubber** molds made to order. Inexpensive, durable. Send model for estimate. We teach marbleizing and mold making in all branches. Send dime for S.R.C. testing material and miniature mold and cast, assorted marbleized samples. Cowell Institute, Grayling, Mich.

**NEW Refillable punch boards** sell wherever demonstrated. Big profit operating or selling outright. Currier Mfg. Co., 314 Terminal, Minneapolis, Minn.

**SEE Our display advertisement** on page 8A this issue. Rapaport Bros., 703 West Ohio, Chicago.

**PRINT Signs, pictures, Christmas cards, etc.** Outfit complete, special \$3.00. Sign House, 215 North 4th, Columbus, Ohio.

**EARN Quick cash** raising mushrooms in cellar, shed, attic. We buy crops. Guaranteed materials furnished. Easy, odorless method. Book free. United, 3348-CY Lincoln Ave., Chicago.

**"THE Key to Business Opportunities"** free. Goodall, Box 1592, San Francisco.

**ARTIFICIAL** Marble making puts you in paying business all your own. Easy, pleasant, profitable work. Interesting particulars free. Marble Institute, 4612-C North Homestead, Chicago.

**SIGNS** And showcards easily painted with letter patterns. Large variety of styles and sizes. Write for free samples. John Rahn, A-2126 Nava, Chicago.

**PROFIT** With new products. Make, sell, repeat. Guaranteed formulas, special prices, leads. Biggest catalog free. Gibson, Chemist, BD-4702 No. Racine, Chicago.

**SIGN Painting** made easy with letter patterns. Samples free. Clark, Ellwood City, Pennsylvania.

**CASH Income** resilvering mirrors; replating metalware; making glass signs. Portable outfit. Sprinkle, Plater, 127, Marion, Ind.

**MAIL Order** book, 200 pages, tells how I built \$10,000 business. Free information. Author, 3103 E. 18th, Kansas City, Mo.

**ENTER** Exclusive business reinking used typewriter ribbons. New invention! \$50 required. Merit, 24 West 20th, New York.

**ATTAIN Independence.** Learn the collection business. Write Cole Associates, Tower PM-D, Syracuse, New York.

**BIG Money** at home plating auto parts, reflectors, mirrors, chandeliers; by new method; experience unnecessary. Outfits furnished. Gunmetal Co., Ave. N, Decatur, Ill.

**IRISH Moss** with my instructions will build you a permanent business. Sample for stamp. No postals answered. Uncle Artie, Wareham, Mass.

**NEW Product; profits** guaranteed. Sample \$1. Magico, 5721 Adelphi, Cincinnati.

**MAILING Secretaries** wanted. Experience unnecessary. Pay weekly—part in advance. Contract—details, 3c stamp. Nagel Enterprises, 1329 Olive, Indianapolis, Ind.

**GENUINE Mexican opals.** Perfectly cut. Edman, Apartado 162, Mexico City.

**FREE Circulars** describing how you can make real, big money in mail order business at your home. Write today. Mail Order Institute, 669-H Marey Avenue, Brooklyn, N. Y.

**WIN Thousands cash.** Send 10c list, legitimate contents. World Contest Magazine, 6323F 17th N. E., Seattle.

**ORDER** Pure spore cultured mushroom spawn from this ad. Each bottle plants 40 square feet, \$1.00 postpaid. Satisfaction or money refunded. Instructions free with order. Sterling Spawn Co., West Chester, Pennsylvania.

**MAKE Your own products.** Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1950W Broad, Richmond, Va.

**RESILVER** Mirrors, plate auto fixtures, tableware. Portable outfits. Metalcraft, Landerman Bldg., St. Louis, Mo.



**SUCCEED** With your products. Make-sell them. Formulas. Processes. Analytical service. Catalog free. R. Thaxly Co., Washington, D. C.

**SCREW-HOLDING** Screw drivers! Not magnetic! Remove, hold, insert screws in accessible places. Factories, garages, electricians, mechanics, radio, autoists buy; no competition! Quick sales, big profits. Exclusive territory; also foreign. Millenco, 5067 Winthrop Bldg., Boston, Mass.

**GOOD** Brick butter (not butterine) 6c lb. Particulars 25c coin. Results guaranteed or money refunded. Hallbeck Co., 6219L Wentworth, Chicago.

**MONEY** Making art. New, practical course. Norman Feather, Parkville, Mo.

**BIND** Your own books, magazines, etc. Enjoy hobby, small cost. Do bookbinding for others, rebind for libraries, nice profit. We furnish all supplies and easy rules. Complete outfit \$9.37. Write for details. Kelsey Binders Supplies, P-101, Meriden, Conn.

**COPIES** Of 5 successful jobwinning application letters, 25c. Business Letter Institute, A-263 South Dearborn, Chicago.

**LEARN** Motion picture theatre business. Catalog & free. Theatre Institute, Elmhurst, New York.

**SOAP** Making, learn at home. No machinery needed. Easy to start. Write L. Pozora, 3619 N. 25th St., Milwaukee, Wis.

**FREE**—Books, mail order business. Stamp appreciated. Dolson Herald, 36 Liberty Street, Brooklyn, New York.

**MONEY** Making formulas, processes; all lines. Information free. Choro, Industrial Chemist, Crawfordville, Ind.

**MAKE** Concrete ornaments. Profitable winter proposition, using metal production moulds. Frog mould, 3x5 inches, makes hundreds quickly. \$1. prepaid. Owen Gardenware, 2501 Grinstead, Louisville, Ky.

**OPEN** A key-making shop. Start a permanent profitable business with a small sum. No skill necessary. Write for particulars. Belaser Mfg. Co., 411 E. Fort, Detroit, Michigan.

**GROW** Mushrooms all year round—a steady income indoors, in cellar, shed or stable. Exclusive new process. Bigger, better, quicker crops—more money for you! Book free. American Mushroom Industries, Dept. 960, Toronto, Ontario.

**ADVERTISING** Business of your own. Be independent. Complete instructions \$2. Cash or money order. D & H Enterprises, Box 222, Flat River, Mo.

**MAIL** Order industries—40 pages opportunities, plans, formulas, 10c coin. Amos Sullivan, Fairport, N. Y.

**LEARN** Taxidermy. Five courses. Blue Beaver Taxidermy School, Lemont, Ill.

**GREATER** Earnings! Home, office. No canvassing. Write for unusual opportunities. Hochman Service, 269 West First, Mt. Vernon, New York.

**DOLLARS** Daily! Operate home! Mail-order business. Details. Duffy, Covington, Kentucky.

**DISTRIBUTORS**—Supply revolutionary corn remedy to stores. New sales plan results in landslide of orders. Up to 150% profit. Write for exclusive franchise. Reliable Specialty Corp., Buffalo, N. Y.

**A FORTUNE** Awaits you! New formulas for establishing business at home in spare time. Particulars free. Hetzel, 803 Garden, Hartford, Conn.

**CHARTERS:** Delaware; best, cheapest; free forms. Colonial Charter Co., Wilmington, Del.

**LEARN** All about casting marble novelties in rubber moulds. Cement secrets. Illustrated catalog and beautiful samples 3c. (So. Calif. business reserved.) John A. Payn, 945 Grande Vista Avenue, Los Angeles, Calif.

**ARTIFICIAL** Marble formulas. 3 for 25c. Johnson, 4520-Christiana, Chicago.

**WE** Buy names. Instructions 25c. Contract. Accounting Service, 9 Washington Ave., Minneapolis, Minn.

**MANUFACTURE** For profit. Substantial income making today's biggest-selling popular necessities—all lines—from my world famous guaranteed formulas. Get my free "eye-opening" literature. Miller, Chemist, 1748 PMB, Tampa, Fla.

**"SCHEMER** Magazine." Alliance, Ohio, prints schemes, ideas, business starters, formulas; winners—\$10,000 to \$50,000 reported. 36th year. \$1. Subscribe now. Six months special, only 30c.

**TWELVE** New successful money-makers. J. Home, 3949 Metropolitan, Chicago.

**LIQUID** Marble—Anyone can make! Colorful, glazed! Molded, brushed, sprayed. Rubberlastic molds. Composition flooring. Big money making these! Particulars free. Marbleizing Service, Edwardsville, Ill.

**CHEMICAL** Expert will furnish formulas and trade secrets. All lines. Lists free. W. L. Cummings, Ph. D., 223 Gordon Ave., Syracuse, N. Y.

**START** Little business anywhere. Everything furnished. No canvassing. Maywood, PM-923 Broadway, New York.

**SELL** By mail. Books, novelties. Bargains! Big profits. Particulars free. B. Elfeo, 525 S. Dearborn, Chicago.

**FREE** Booklet describes 87 plans for making \$24-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

**ARTIFICIAL** Marble sanitary flooring, instructions covering wood or cement flooring ½ inch thick, fireproof, all colors, low cost. Ornamental casting, concrete plaster papier-mache decorations, garden furniture, statuary, flexible molds, particulars and illustrations free. Chris. Mahler, Elmont, N. Y.

**MAIL** Order business is your opportunity. Many began small, now earn thousands yearly. No personal contact. Boundless opportunities. Have had over 30 years experience; will help you succeed. Send 25c for valuable booklets, none free. B. Breniser, 257 South 21st, Philadelphia.

**BARGAINS**—Paint spray outfit, gasoline engine drive. Terms-trial, Helmick Paint Spray Exchange, M-153, Troy, Ohio.

### FORMULAS AND TRADE SECRETS

**TESTED** Formulas 30c each. List free. Ogg Laboratories, Tampa, Fla.

**ANY** Formula two dimes or money refunded. Westcott, Clyde, N. Y.

**FORMULAS, Processes;** all lines. Individual service by experienced chemist. Clore, Industrial Chemist, Crawfordville, Ind.

**500** MONEY Making formulas, 25c. Womble's, Elber City, N. C.

**LABOR** Saving paint and varnish remover for any surface. No scraping. Paint rubs off. Non-injurious. Costs 50 cents gallon to make. Formula and instructions \$1.00. August Becker Corporation, 300 Graham Avenue, Brooklyn, N. Y.

**MANUFACTURERS** Money-making formulas. Products easily made. Thermo Works, Peoria, Ill.

**NEWEST** Guaranteed formulas. Biggest catalogue free. Special prices, leads. Gibson, Chemist, BD-4702 No. Racine, Chicago.

**"50 BEAUTY** Product Formulas" and beauty culture book—\$1.00!!! T-S-G Co., Box Ten, Wilkensburg, Pa. (Non-evaporating anti-freeze—\$1.00!)

**ANTI-MIST!** Coal saver! Anti-freeze. Guaranteed. 25c each. Duffy, Covington, Ky.

**FREE** Formulas given! Particulars free. King Laboratory, 3223 Sixth St., Harrisburg, Penna.

**FORMULAS, Analysis,** free catalogue. Hertzstein, Chemist, 223 Ransom, Grand Rapids, Mich.

**SUCCEED** With your products. Make-sell them. Formulas. Processes. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

**BIG** Money resilvering mirrors. Instructions 25c (coin). Charles, 12-Z, Norwood, Ohio.

**FREE** Formula literature, manufacture products yourself. Thomson, 1309 Pinegrove, Chicago.

**500** MONEY Making formulas 25c. Descriptive circulars free. Harvey Teeple, Decatur, Ind.

**TESTED** Formulas 30c each. List free. Ogg Laboratories, Tampa, Fla.

**500** FORMULAS 25c; Money-making literature free. "Ideal," 178P, Parkridge, Ill.

**GUARANTEED** Formulas, best science can produce for making popular, biggest-selling specialties all lines. Don't buy formulas till you've received valuable eye-opening literature. Miller, Chemist, 706-F Jetton, Tampa, Fla.

**3,000** FORMULAS, Facts, processes, trade secrets in Dr. Brown's Book of Formulas—380 pages. Price, postpaid \$1.00. Ogilvie Publishing Co., 57 Rose Street, Dept. 25, New York.

**FORMULAS, Plans, ideas,** literature free. Belfort, 3042 N. Keeler, Chicago.

**FORMULAS, All kinds,** Guaranteed. Catalog free. Kemico, 31, Parkridge, Ill.

**TESTED** Formulas—Newest, guaranteed! Catalog free. Grinstead Laboratory, Edwardsville, Ill.

### CHEMISTRY

**ULTRA-VIOLET** Fluorescent materials: Filter, bulb, blueprint for building powerful black-light lamp \$2.00. 10 fluorescent specimens \$1.00. Argon lamp and 5 specimens \$1.00. Catalog 10c. free with order. Laboratory Specialties, Box 125, Wabash, Ind.

**STUDENTS:** Send \$2.00 for aluminum weight set, 500 to 1 milligram in paper box. Guaranteed Class 8 tolerance. Thompson Balance Co., Denver, Colo.

**ANALYZE** Fast sellers to get fast sellers. Pitching. Canvassing. Write Associated Chemists, Indianapolis, Ind.

**HANDBOOK** For chemical experimenters, revised and illustrated. 50c. Experiment booklet 15c. Chemical catalogue 10c. Scientific booklet free. Reading Scientific Co., Reading, Pa.

**CHEMICAL** Analysis, industrial problems, and mineral assays. Estimates free. Lowell Bunting, Consultant Chemist, Royal Oak, Michigan.

**10c BRINGS** You new catalog listing chemical sets, microscope outfits and laboratory supplies. Special 30-day offer to those who send immediately. Winn Co., Dept. P-12, 124 West 23 Street, New York.

**CHEMICALS,** Laboratory glassware and apparatus. Catalog CP. Biological Supply Co., 1176 Mt. Hope Ave., Rochester, N. Y.

**CHEMISTS'** Slide rule, editorial Jan. issue, saves time solving equations, gives molecular weights, shows formulas, 391 compounds. Durable precision instrument. Postpaid, complete instructions, two dollars. MWC Company, 508 Andrus Bldg., Minneapolis, Minn.

### SCIENCE

**SUPPLY** Chemical needs in your community. Proven formulae, details 25c coin. Chas. Harker, Box 383, Jefferson, Iowa.

### AGENTS WANTED

**LOCAL** Agents wanted to wear and demonstrate free suits to friends. No canvassing. Up to \$12 in a day easy. Experience unnecessary. Valuable demonstrating equipment, actual samples free. Progress Tailoring, Dept. N-217, 509 Throop, Chicago.

**NEW** Invention. Just out. Fills and drains washing machines. Opens clogged sinks. Household necessity. Brief demonstration sells housewife. Act quick for your territory. Sample 80 cents prepaid. Fill-Or-Siphon Co., 234 E. Manchester Ave., Los Angeles, Calif.

**AGENTS:** Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

**METAL** Polishing cloths. Costs 4c each, retails 25c. Free sample. Superior Specialties, Springfield, Ill.

**MAKE** Big money; commissions advanced; sell raincoats, zipper jackets; union made; latest style; quality; lowest prices; experience unnecessary; outfit free. Goodyear, DO-712 Roosevelt, Chicago.

**LIFE-NIFE.** The knife for a life time, sells itself. Big profit. Send for details or better send 20 cents for sample with sales plan. Windfield Mfg. Co., Box 631, Sioux City, Iowa.

**PROFIT** With new products. Make, sell, repeat. Guaranteed formulas, special prices, leads. Biggest catalog free. Gibson, Chemist, BD-4702 No. Racine, Chicago.

**CASH** Income resilvering mirrors; replating metalware; making glass signs. Portable outfit. Sprinkle, Plater, 123, Marlon, Ind.

**SELLS** Like hot cakes. Big profits. Flory Blossoms, new laundry soapflakes. Perfumes clothes lastingly, when washing. Sunset Laboratories, Lynbrook, N. Y.

**AMAZING** Corn remover. Big profits for distributors. Write Posco, 760 Milwaukee, Chicago.

**SURE-FIRE** Cigarette lighters sell themselves. Last for years. Won't blow out. Burn gasoline or naphtha. Retail 50c. Mail 50c for sample and wonderful proposition. Money back guarantee. Sales plan free. Good territories open. Act now. Bowers Manufacturing Co., Dept. M, Kalamazoo, Michigan.

**SAMPLE** 25c Key check for dime. Wenkhous, Beaver Falls, Pa.

**RAINCOATS,** Zipper jackets; \$2.95. Lowest prices. Union made. Selling fast. Commissions advanced. Experience unnecessary. Outfit free. Royal, T-721 Roosevelt, Chicago.



**MEXICAN** Feather pictures. Great profit. Send 25c (stamp) for \$1.00 worth sample and details. Mexican Art, Apartado 1593, Mexico, City.

**BEAUTIFUL** Full window sign letters. Penny each. Popular sizes. Easily applied. Samples, complete working equipment free. Note our ad page 130A. Atlas Sign Works, 7941 Halsted, Chicago.

**SALES** kit free. Write for our free offer and catalog of household deals, cosmetics, extracts, etc. Make big money selling your friends and neighbors. Clyde Collins Chemical Co., Dept. PM-12, Memphis, Tenn.

**100% PROFIT** In the mystery cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retail 25c. Sample and sales plan 25c. New Method Company, Desk PM-25, New Method Bldg., Bradford, Pa.

**\$2.00 HOURLY** With new, scientific cream that mends all cloth easily, quickly, invisibly, without needle and thread. Stands laundering. Free sample. Sew-No-More Co., Dept. E-741, Cincinnati, O.

**STRANGE** ironing cord. Prevents scorching. Saves electricity. Abolishes kinks, snarls. Approved by Good Housekeeping. For telephones also. 140% profit. Samples furnished. Neverknot, Dept. 1-A, 4503 Ravenswood, Chicago.

**500% PROFIT** Selling new "20-in-1" kitchen utensil. Retail 25c. Costs you \$1.00 a dozen. \$7.20 a gross. Sample 19c. New Method Co., PM-25, Bradford, Pa.

**CASH** Paid for butterflies, insects. See Sinclair Display Advertisement on page 23A.

**\$5.00 HOURLY**. Amazing Karna refinishes autos like new without rubbing, polishing, waxing or painting. Wipes on with cloth. Lasts 8 to 12 months. Free sample. Karna, Dept. E-108, Cincinnati, Ohio.

**DISTRIBUTORS**: Represent manufacturer. Sell Latex—self sealing bandage that breathes. Great demonstrator. Lowest prices. 100% profit. Good repeater. Exclusive territory. Neway, 24-H South Clinton, Chicago.

**100 PROFITABLE** Mail order and local business plans. A. Pruitt, Elburn, Ill.

**MARRIED** Man with spare time to distribute free samples coffee, flavoring, food products and make customers. Must devote at least two hours daily and be satisfied with up to \$3 in an hour. Permanent. Blair, Dept. 31-A, Lynchburg, Va.

**250,000 ARTICLES** Wholesale. Large illustrated wholesale catalogues. Supply sources live. Amazing new combination deals. Circulars free. Patterson, 3705A University, Des Moines, Iowa.

**NEW**: Enormous profits, year round seller everywhere; fills need; pocketful will make big day's pay. Write G. E. Cassidy, 500 Fifth Ave., New York.

**WORLD'S** Great novelty, Midget Bible. Smallest Bible produced. Quick seller. Everybody buys. Details, sample 10 cents. Galea, Box 14, Hempstead, N. Y.

**DISTRIBUTORS**—Smashing new sales-card plan. Entirely new idea. Every punch wins! Associated Sales, 2650 N. 40th St., Milwaukee, Wis., Dept. J.

**DOUBLE-EYED** Self-threading needle packages, size 3/2. Blind people thread them. Invaluable for failing sight. Necessary for good sight. Sample, particulars 10c. Agents wanted. Wm. Giesby, Vandalia, Ill.

**SELL** Products under your own label. Big line. Low prices. Edward-Walfred, 5097-P Irving Park, Chicago.

**I WANT** Men for local tea and coffee routes paying up to \$60 a week. No experience required but must be willing to give prompt service to approximately 200 steady consumers. Write Albert Mills, Route Mgr., 8915 Monmouth, Cincinnati, O.

**AGENTS**: Smash go prices. Santos coffee 12c lb. 4-oz. vanilla 8 1/2c. \$1.00 size tonic 14c. Razor blades 10 for 8 1/2c. 100 sticks chewing gum 12c. 150 other bargains. Experience unnecessary. Write Carnation Co., P.O. St. Louis, Mo.

**SUCCEED** With your products. Make-sell them. Formulas. Processes. Analytical service. Catalog free. B. Thaxly Co., Washington, D. C.

**AGENTS!** Every housewife a prospect! Device cleans outside windows from inside. Earn enormous profits. Heller Products Co., 2350 Seminary, Chicago.

**RIO** Commissions in dignified business. Revolutionary new humidity system, practical part of air conditioning. Entirely automatic. Easily installed. Necessary in every home. Priced for every purse. Send 25 cents for blueprint, data and agency proposal. Dept. P. Moore Mfg. Co., 605 Washington Blvd., Chicago.

**FOR** The holidays—our Luminous Crucifix which "shines in the dark" is the most appropriate gift of all. An instant demonstration and the sale is made. Big profits. Harman Co., 2339 South State, Chicago.

**PORTRAIT** Agents—Lowest prices, portraits, frames. Catalogue free. Picture Man Friedman, 528 Cornelia, Dept. 9, Chicago, Illinois.

**GENUINE** Gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B North Clark, Chicago.

**MAKE** Products yourself. Formula catalogue free. Kemica, 45, Parkridge, Ill.

**REGULAR** Income; home, office, no canvassing. McArthur Co., Desk 5, Butte, Mont.

**FREE** Literature describing many money making plans. Belfort, 4912 N. Keeler, Chicago.

**BIG** Money applying gold initials on automobiles. Easiest thing today. No experience needed. Free samples. "Ratco," 1081 Washington, Boston, Mass.

**MAN** in each town to plate auto parts, reflectors, bathroom fixtures, refinish beds, mirrors, chandeliers; by new method. No capital or experience required. Simple plan of manufacturing at home starts you in big money-making business. Outfit furnished. Free particulars and proofs. Gun Metal Co., Ave. H, Decatur, Ill.

**BIG** Money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50; make \$1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Company, Dept. 40, East Orange, N. J.

**AGENTS**—Opportunity to make money; book containing 87 successful business plans; home or office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

**A BUSINESS** Of your own making sparkling glass name plates, numbers, checkerboards, medals, signs. Booklet and sample mailed free. E. Palmer, 512, Wooster, Ohio.

**PROFITABLE** Home business. Leutlman. No canvassing. Maywood Publishers, P-923 Broadway, New York.

**BE** Independent. Own your business; experience unnecessary. Selling \$10,000 accident death, \$50 accident; \$25 sick weekly benefits—\$10.00 yearly. Other amounts proportionate. Guaranteed steady renewal income. \$250,000 deposited insurance department. Universal Policy, 716-A Lefcourt Bldg., Newark, N. J.

#### HIGH-GRADE SALESMEN WANTED

**YEAR'S** Income in 3 months! New federal, state and code laws create immense demand for simplified record system every businessman must have to protect himself against fines and penalties. Millions must buy again now. Our men selling 5 to 25 daily our officially approved, copyrighted Liberty Tax Record. \$3.50 cash profit every sale. Repeat commissions without callbacks. Live leads furnished. Big season now. Choice territories going fast. Commonwealth Publishing Company, 503 So. Dearborn, Chicago.

**PENNY** Each, popular sizes. Non-tarnishable window sign letters. Enormous profits. Free working equipment, sample. Record breaking offer. Note our ad page 130A. Atlas Sign Works, 7941 Halsted, Chicago.

**GET** in on the ground floor with a growing concern. Sell products needed in every home and business establishment. Territory available. Fabron, Leominster, Mass.

**DISTRIBUTORS**: Represent manufacturer. Sell Latex—self sealing bandage that breathes. Great demonstrator. Lowest prices. 100% profit. Good repeater. Exclusive territory. Neway, 24-H South Clinton, Chicago.

**SALESMEN**: Acquainted with garages, filling stations, to handle local business. Write Colgra, 2827 N. Third St., Milwaukee, Wisconsin.

**STRANGE** Chemical sponge cleans wallpaper like magic. Banishes housecleaning drudgery. Women amazed. Hustlers cleaning up. Outfit free. Kristee Mfg., Box 1431, Akron, Ohio.

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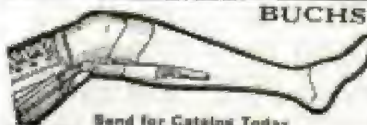
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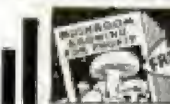
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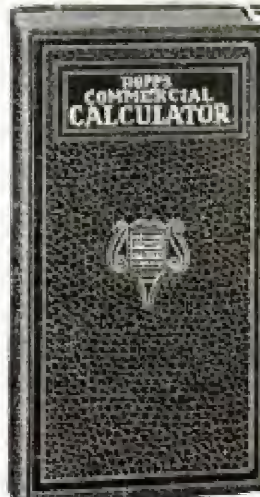
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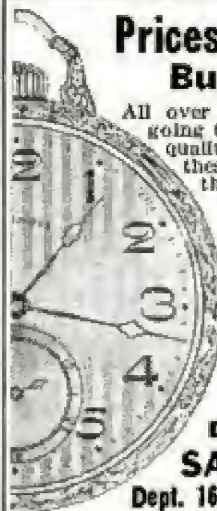
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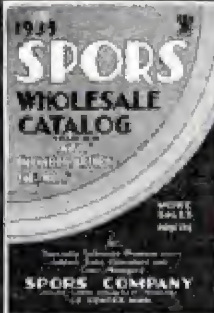


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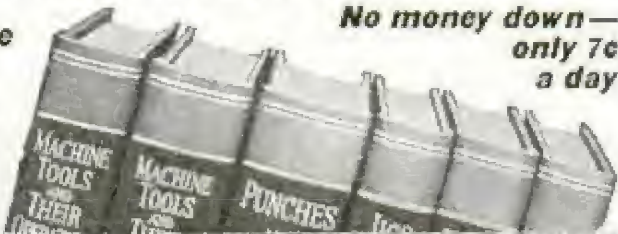
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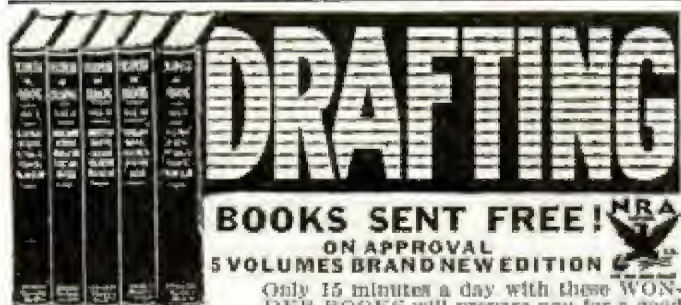
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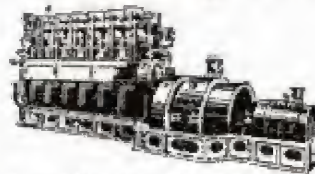
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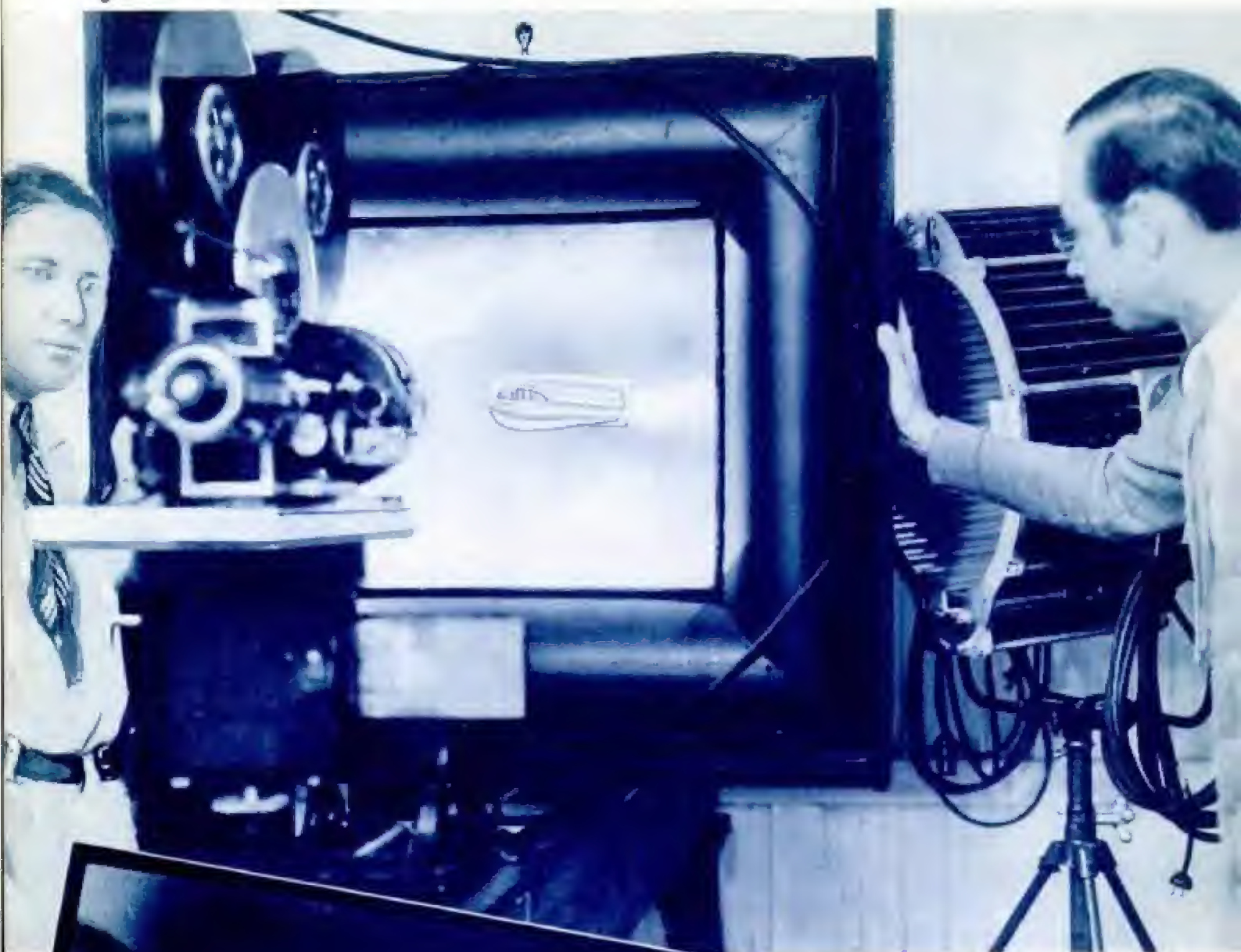




# MOVIE MAGIC *IN THE* MAKING

THIRTY thousand movie "pieces of eight" glisten in the studio spotlights in this scene from Metro-Goldwyn-Mayer's "Treasure Island."





FILMING flight of rocket plane. The plane is stationary but the background of cloud moves. Left, Ray Mercer, trick man, inserting liquid smoke in plane.

## PART II

**H**AVE you ever wondered over the rope trick in the movies in which a magician apparently tosses the end of a rope into the air and then climbs it hand over hand? On the screen part is real and part is not. The actor goes through the motions of tossing the rope into the air and you see it travel upward and stay suspended in space. That part is done in reverse, filming the rope as it hangs suspended from an invisible wire and its



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PICTURING miniature plane descending at emergency field at Universal studios. Right, using underwater camera to film a Paramount deep-sea picture.

subsequent drop when the wire is released.

Thin wires invisible on the screen are also a first aid when an inexperienced star is called upon to outline another actor against the wall by throwing knives. The star throws a knife and you see it hurtle through the air to strike and quiver in the wood a fraction of an inch from the man's throat. This, also, is shot in reverse, the knife being pulled from the wood and yanked backward by means of a wire.

Sometimes events from real life lend an air of authenticity







D1037

**PREPARING** to film a scene on a studio schooner. Right, here is how a stratosphere flight was filmed in a Monogram production. The gondola of the balloon, built to exact scale, is suspended from a scaffold.

to a picture that would be hard to obtain otherwise. In simulating the flight of a stratosphere balloon, the exact dimensions of the gondola were obtained and a wooden replica was built for close-up shots. Then a camera crew was sent to the middle west to film the actual take-off of the real balloon. The balance of the flight, naturally, had to be done in miniature, with the model balloon swinging and swaying on a wire while off-stage smoke pots and electric fans furnished storm clouds, an overhead needle spray

provided driving rain, and realistic lightning flashes from a flickering sun are lit up the scene.

Hardly a month passes without some mechanical improvement to pictures. When sound first came in half a dozen microphones were hidden in different parts of the set and it was the mixer's job to switch off one "mike" and switch on another as the actors moved around. Today an overhead microphone dangles from the end of a crane just out of the camera's range. Two men operate the







D 037



WHEN unusual figures are to be filmed, the special effects men are called in. Ray Mercer devised the robot on the left, but the mechanical man is operated by a real man inside it. Below, Willis O'Brien created this effect by using miniatures and a background painted on glass. The girl on the cupola is a motion picture projected from behind through a hole in the miniature. Right, M-G-M crew at work on "Treasure Island."

crane, shooting it in and out to stay in range of the voices, and twisting the microphone rapidly from one side to the other to catch both sides of a conversation.

Even the sound track on the side of the film has been improved and sound technicians have learned to superimpose one sound track upon another like making a double exposure with a camera. As many as half







a dozen different sound tracks can be blended into one, so that to an original conversation a background of music or the swishing of surf can be added from negatives in the sound library.

Some of the things that have improved the mechanical qualities of pictures in the last twelve months include an increased frequency range in the sound track that makes for greater naturalness of sound, improved types of microphones, new silent and lighter cameras and improvements to camera booms that allow a greater variety of moving shots, the new "background" type of film negative that has an extremely fine grain, and the perfection of "soft" sets, consisting of cloth walls covered with heavy paint that reflect sounds to the microphone with greater naturalness than do the sets built of wood.

In the next ten years, motion picture technicians hope, colored films and stereoscopic pictures will come into their own. Delicate shadings and subdued colors instead of the glaring hues that fatigue the eye will be the turning point in colored pictures. Engineers (*Continued to page 126A*)





D1037



CLEOPATRA'S barge, a miniature ship with miniature hills in background, shown in Paramount picture. Above, at work on the sound stage.



D1364

Contr. Am. Seaside  
4 W. 103rd St., New York

# COMET ON RAILS

## BRINGS AIR SPEED TO EARTH

ONLY a few years ago the east and west coasts were very remote places, separated by terrible deserts, mountains, swamps, and bad lands. But how those deserts have shrunk!

The Union Pacific's streamline flyer, the first of many to come, has crossed the continent in fifty-seven hours, bringing the speed of air travel down to earth. Regulation steam trains cover the same distance in eighty hours.

If a business man in Chicago wishes to spend a busi-

*A Striking Contrast between the Old and the New in Railroad Travel—the Union Pacific Streamline Train Nearing New York on Its Record-Breaking Transcontinental Run, and an Early Transcontinental Train*







west. Rumors told of prospectors panning gold at the rate of one dollar per minute! A man and a pan often earned up to \$5,000 per day! Boys found \$1,000 nuggets on the open trail!

Who could resist such tales of gold? Men with adventure in their veins set out at once. But in the promised land it was not so easy to find the gold. The cost of living was often unbearable: ten dollars for a shovel; \$400 for a barrel of flour; three dollars for a cup of coffee, and one dollar for an old newspaper.

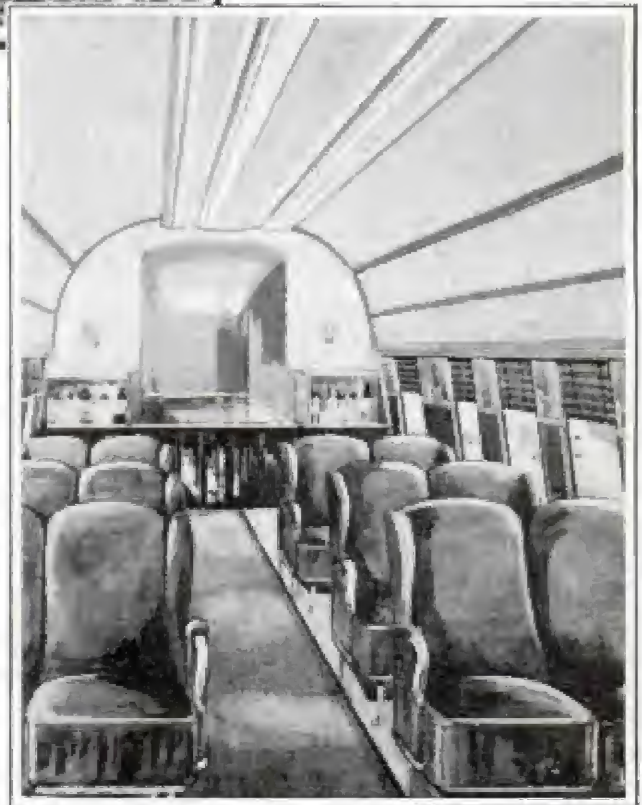
The covered wagon gave way to the prairie schooner, a huge vehicle drawn by six to twelve horses, and costing from \$3,500 to \$7,000. The overland freight lines, consisting of pack trains and

(Continued to page 116A)

ness day in San Francisco or Los Angeles or Portland, Ore., and return immediately, it will now take five days to make the trip using the present steam trains, while with the streamliner he will be able to make the same trip in three days, saving two whole business days or forty per cent in time.

Who remembers the day when trains of prairie schooners covered the long overland trail in the record time of six months? Look backward only a few years and recall the struggles of those pioneers who crossed on the Overland Trail. They fought up the slopes of high mountains. The streamliner surmounts these same mountains without a whimper. It skims across the Continental divide at eighty miles an hour.

The west, before the discovery of California gold in 1848, was about as well known as the Arctic is today. But the desire for gold was the flash in the pan that started the great movement from east to



Interior of Early "Palace" Sleeper Contrasted with Coach of Union Pacific Streamline Train





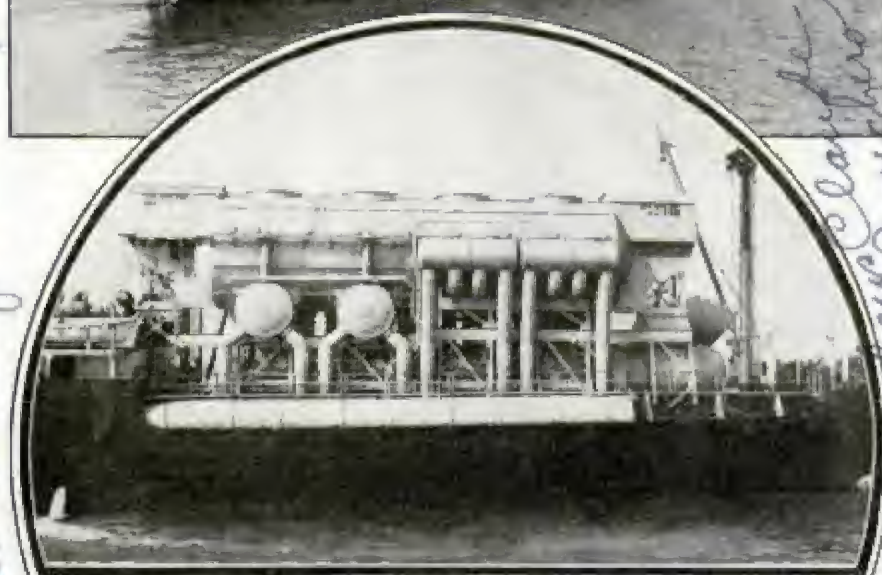
Above, Rear of Buffet Car of Union Pacific Train; Below, Left, Each Seat on the New Train Is Like a Compartment in the Pullman Cars; Right, Note Upper and Lower Berth Arrangement



D1285

negative machine

see page 100



Top, Steamer at Anchor Ready to Make Ice from Tropical Sea Water;  
Bottom, Close-Up of Conversion Machinery on the Ship

### "FLOATING ISLAND" SHIP TO MAKE ICE IN TROPICS

Two thousand tons of ice per day is the estimated output of a "floating island" ship equipped to make use of the differences between temperatures of surface water and that from the depths. The plant is a vacuum turbine, which operates on the principle that water in a vacuum will boil at unusual low temperatures. The "steam" from the vacuum boiler runs the plant. Cold water from the depths condenses the steam which returns to the boiler in the form of water. By using a ship, operators of the plant always can obtain the proper depth for most efficient production.

### PRINTS MADE FROM WET FILM WITH AID OF "CELLOPHANE"

Photographic prints can be made from wet film or plates with the aid of a re-

cently processed water-proofed Cellophane. The method is useful where speedy development is essential and prints from negatives are desired immediately.

### HARD-SURFACE RUG LAID IN STREET

Laid in the center of a city street of Oklahoma, one of the largest hard-surfaced rugs in the world has been subjected to automobile and truck traffic to test its wearing qualities. The rug is 226 feet long and nine feet wide, with a delicate pattern that might be found on similar floor coverings in the home. It is made of a composition asphalt material which is water-proof and has a felt base. Used as a floor covering, the material clings to the floor without being glued or cemented. However, it was glued to the street in

the test which covered about two weeks.



City Traffic Tests 226-Foot Hard-Surfaced Rug

Central Camera Co.

Paraffine Companies

Ateliers et Chantiers de France.  
Ingénieur en Chef.  
St. Quentin, France.

Chicago 3900 S. Federal

San Francisco, Calif.

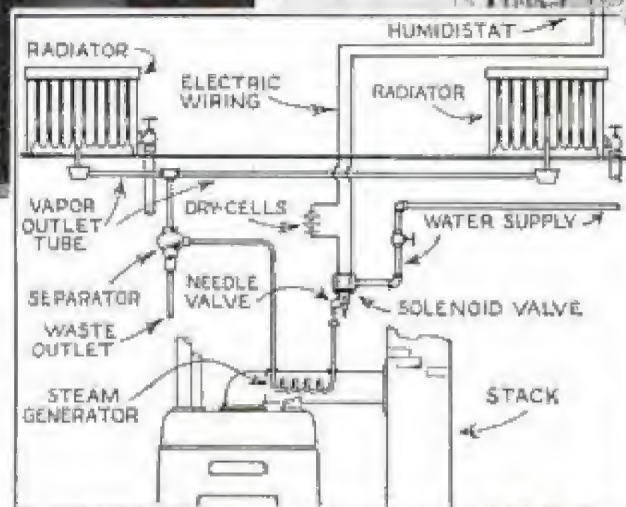


# Humidity Regulator Fits Any Heating Plant

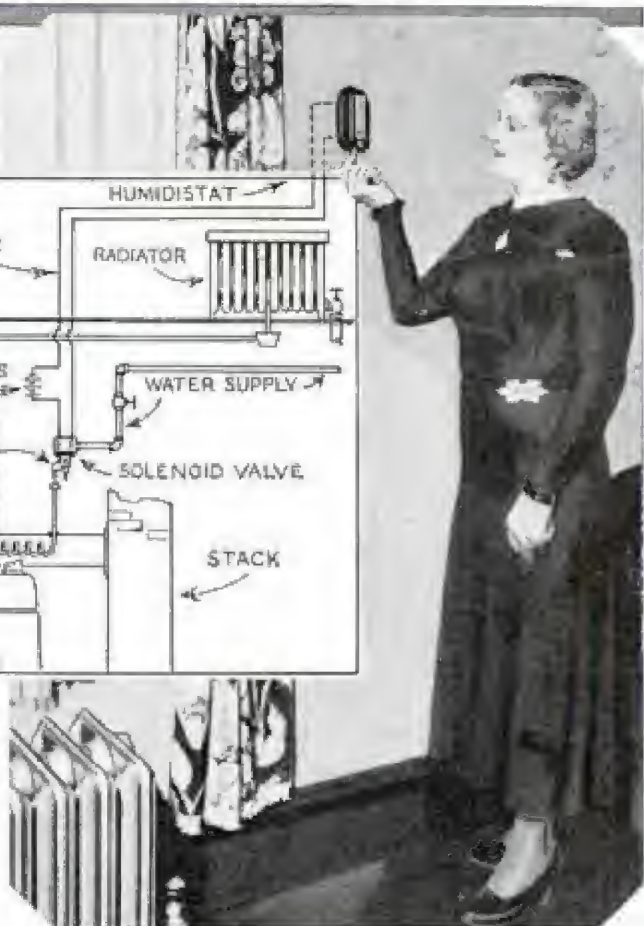


Left, Humidity Device Installed at Furnace; Center, How It Works; Right, Simple Control on Wall Regulates Humidity

Maintenance of the proper humidity in the home is made easy by a patented system that employs an automatic controlling device. A humidistat, set on the wall of the hall or any room desired, has an indicating adjustment at its base and a pilot lamp that lights when more moisture is required. Invar metal, which does not expand with heat, makes the humidistat more accurate. When the humidity becomes lower than that set on the humidistat, it automatically opens a valve



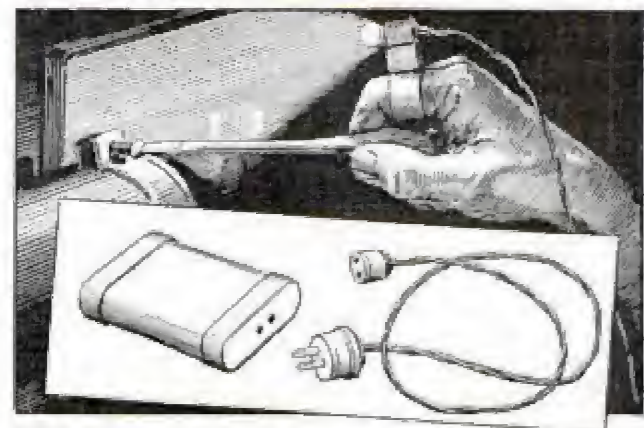
which feeds the proper amount of water from the water-supply system to the steam generator in the heating plant, resulting in vaporization of the water. This vapor passes through a separator which permits only pure vapor to pass into the house with the hot-air stream of the radiator.



The system may be used with any heating plant. It is put up in kits.

## Emergency Light for the Finger Leaves Both Hands Free

Attached to the finger with a spring clip, a handy little inspection light leaves both hands free to handle tools in making car repairs at night. A length of flexible insulated wire leads to a flashlight battery carried in the vest pocket, or the cord can be disconnected from the battery and joined to an auxiliary extension connecting with the car lighting system.



Handy Light Which Can Be Attached to Finger, Leaving Both Hands Free to Make Car Repairs

Color Seal. A sealing paint has been developed to prevent "bleeds" or discoloration of succeeding finishing coats.

The Slidder Co. Road.

American agent

M. H. Richardson, Bell St. Wolverhampton, England



D13 28.

# Washington Monument Is Given a "Facial"



Steel Scaffold for Making Repairs to Washington Monument, and Workmen at Top of Shaft

Time, the great destroyer, has attacked the Washington monument, so this shaft, a mere infant as monuments go, is getting a \$100,000 facial treatment and bath. With proper care, engineers estimate the monument may live as long as the pyramids. For the repair work, 600 tons of steel scaffolding were erected around the shaft. Made of iron pipe, the scaffolding was so placed that it could not injure the 555-foot monument. Its main supports rise perpendicularly, not parallel to the sloping sides of the monument, and it is terraced like a skyscraper. No vertical load is permitted to touch the shaft and where the framework rests against the monument at certain points for horizontal support, wooden wedges are placed next to the stone to prevent rust stains. Bolts which hold the pipe together are treated with a paraffin base product to keep them from rusting. An elevator and an iron ladder carry workmen up the scaffold and

an outside standpipe raises water to any height where it may be needed. Masons first are channeling out deteriorated mortar from between the 9,000 huge stones and filling the cracks with new pointing mortar. About 48,000 lineal feet of old mortar will be dug out and replaced with new mortar, carefully tested so its color will blend with the stone and the old mortar. When this work is finished, the whole structure is to be cleaned. The contractors plan to use old-fashioned soap, water and brushes for the cleaning. A covered passage was built over the approach to the



monument entrance, so visitors can pass in and out as the work proceeds.

D1342

## SCOOP SIFTS FURNACE ASHES

Unburned coal or coke is sifted from the ashes in the furnace ash pit instead of moving it outside with the aid of a scoop fitted with bars instead of a shovel. The draft in the pit carries all soot and dust up the chimney and the unburned fuel is shoveled immediately into the fire box, thus eliminating a second handling.





D/354 Cont. Ls. H. Davis, Esq.  
"Limners, Hillside Road.  
Middlesex England



These Drawings Show Construction Details of the De Havilland Comet in which the British Flyers, C. W. A. Scott and Campbell Black, Won the London to Melbourne Air Race in Two Days, Twenty-Two Hours and Twenty-Five Minutes

De Havilland Aircraft Co. Ltd.  
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# Long-Wearing Cement Paint Is Fire Resistant



This Tester in a Short Time Exposes Paint to the Equivalent of Several Years of Ordinary Wear; Note Ultra-Violet Light Section

Exceptional durability and resistance to fire are only two of the unusual qualities of a general purpose paint made of Portland cement combined with pigments ground in treated oils. The result is a paint which has a filmlike cement, yet retains a high degree of elasticity, producing a close-grained flat finish which will not crack or chip. This paint has been used and tested for more than twenty years on such structures as bridges, airplane hangars, railroad stations and on stucco, concrete, cement and brick surfaces. For wood surfaces, it reduces the fire hazard without sacrificing wearing or protective qualities, as is sometimes the case with fire-retarding paints. The paint is well suited to metal surfaces since the cementlike film will not crack or chip with

expansion and contraction of the metal. As it is weather and water proof, it makes an ideal coating for the under side of automobile fenders. It can be applied to new galvanized iron without using any special priming coats or chemicals and adheres firmly to all kinds of masonry surfaces. In applying it to new cement or concrete structures, the surface is first treated with a lime-proof size which can be added to the first coat of cement paint, if desired. On wood, the paint gives the soft finish now popular for decorative purposes. It can be applied with a brush or spray and thinned as desired by adding linseed oil and turpentine. The paint adheres so firmly to the surface it covers that it becomes a part of the surface rather than a film over it. Galvanized-iron sheet metal covered with the paint, for instance, can be bent double re-

peatedly without causing the paint to crack or chip. It dries in twelve to fifteen hours and is made in a variety of colors.

D/335

## TANK WAGON SALES COUNTER

Dispensing with the possibility of a human error, a gallonage counter for the tank wagon works automatically. As the valve is turned to release gasoline the counter records the number of gallons passing through the outlet.



D/368  
General Paint Corp 2627  
Any H. San Francisco Calif

Harley  
Hartley and others  
620 Berkeley St

Carry, I need

Sure Tally Co.



1262 Mr. Lawrence Shadokins  
3616 E 81st St.  
Cleveland, Ohio

# FIGHTING MOBS and CRIME WITH TEAR GAS...



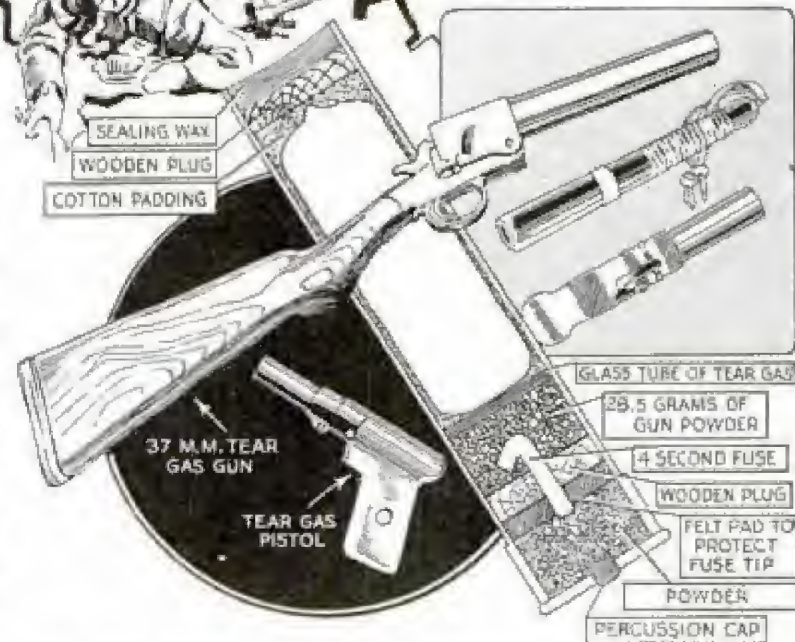
ONLY a few years ago, a serious riot often meant the death of scores of persons. Today, thanks to recent developments in the gases first used in the World war, chemical compounds have become more effective than bullets in fighting crime and quelling mob violence.

One bullet can affect but one man, but one tear-gas shell renders many helpless. And the gas goes around corners, through cracks, into crevices and over barriers where bullets could not reach.

Lachrymal gas, as tear gas is known to chemists, is not new. As early as 1887, Prof. Baeyer, renowned organic chemist of Munich, pointed out the military value of this gas in his lectures, and chemical devices to protect bank vaults and safes were registered in the United States patent office as early as 1871.

Tear gas was used to disable troops during the World war, but after the war it was developed

so it could be used without causing permanent injury and this has made it a humane agent in suppressing mass violence. Contrary to common belief, it does not affect the tear ducts but the mucous membrane of the eyelids. It is this irritation of the lids which



Above, Using Tear Gas to Quell Rioters; Center, Prof. Baeyer Who, in 1887, Pointed Out Military Value of Tear Gas; Below, Diagram of Tear-Gas Guns and Shell; Note the Glass Tube in the Shell Which Holds the Tear Gas

Lake Erie Chemical Co. 5806 109th Ave Cleveland, Ohio

W. S. Harley Co., 2810 W. Washington, Chicago





*Troopers Quelling a Mob with Tear Gas; in Such a Situation Tear Gas Often Prevents Hand to Hand Encounters and Possible Loss of Life*

causes tears to flow. Nausea gas is a newer chemical compound adapted to fighting the mob bent on destruction of life and property, rather than merely dispersing a disorderly crowd. Like tear gas, it causes no permanent injury, but it is much more severe than tear gas and its effects are likely to be felt for several hours after it is inhaled.

As a solid, nausea gas is a fine, bright green powder which changes to fumes of light blue with the application of intense heat. It attacks the respiratory system much like a common head cold. The faint blue haze which heralds it first causes an unpleasant tickling in the nose, followed by sneezing. Then the eyes begin to water and soon after a soreness develops in the throat. This is followed by nausea and vomiting.

Weapons for discharging these gases include pistols, fountain pens, long-range rifles, grenades and police clubs. Shells are made to fit almost any revolver, but the range of gas from such shells is only a few feet. There is also a grenade containing a

glass tube of liquid tear gas. The cylindrical metal casing has a perforated base so that, when the grenade is thrown against a wall or other hard surface, the glass tube is shattered, allowing the liquid to volatilize without an explosion and escape through the openings in the cylinder.

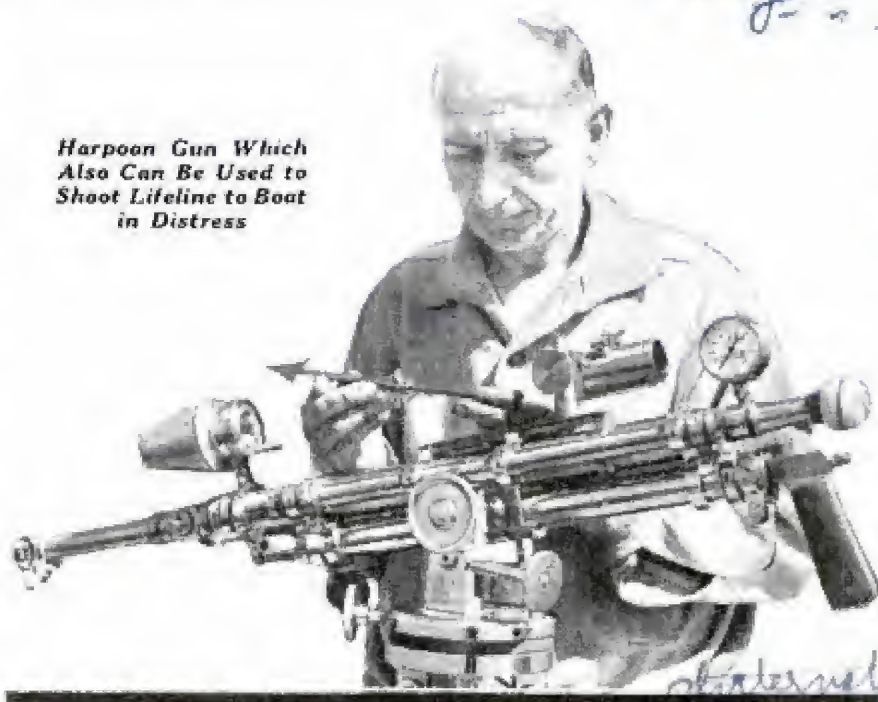
The long-range gas shell used today for offensive purposes is effective up to 150 yards while a similar shell used for defensive purposes has a range of about thirty yards. The former has an outer shell and inner projectile. When the pin of the shotgun hammer strikes the percussion cap, the gunpowder charge is ignited and shoots out the projectile. Simultaneously a four-second fuse in the projectile is ignited, causing a powder charge inside to explode, bursting a glass tube and liberating the gas. The projectile is made of aluminum which does not shatter but rips evenly, lengthwise. The cartridge for revolvers is an adaptation of the regular shell, a gelatine tube of tear gas replacing part of the powder charge ordinarily used.



D1319- G. O. Allen  
Santa Monica  
Calif

Within the past few years tear gas has come into wide use for protecting banks. One effective method of safe protection is designed after the present-day burglar alarm. A gas shell is placed in a barrel mounted near the top of the safe and pointing downward. The firing plunger is held back by a magnet. A wire criss-crossing the safe door carries the current to the magnet. When the surface of the door is broken, the wire is severed, this cuts off the current and the magnet releases the firing plunger which sets off the shell, shooting the gas down in front of the safe. Some banks are also equipped with gas shells mounted above tellers' windows. They are operated by electric buttons and are designed to thwart daytime robberies.

Harpoon Gun Which Also Can Be Used to Shoot Lifeline to Boat in Distress

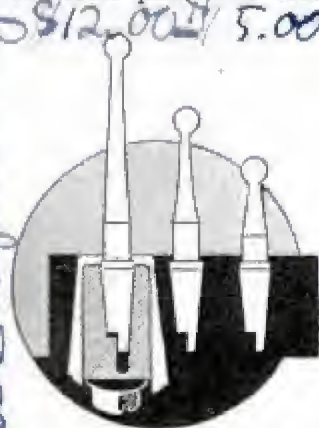


### HARPOON GUN SHOOTS LIFELINE TO BOATS IN DISTRESS

Equipped with many adjustments to insure accurate shooting, a harpoon gun has been made by a California race driver, C. R. Klein, to be used in shooting swordfish, sharks and other large ocean specimens. While intended primarily for sport, this gun also can be used in emergencies for firing lifelines to boats in distress.

### DENTIST'S DRILL HELD FIRMLY BY TAPERED SHANK TOOL

Greater accuracy in dental work and decreased pain for the patient are two results of using a handpiece system designed to hold the removable instruments firmly in a tapered shank tool.

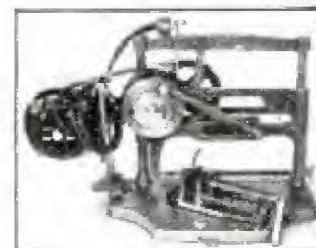


With this system, it is possible to use any bur, stone, mandrel or other instrument with the taper shank in either a straight handpiece or a contra-angle handpiece. The taper shank instrument has the advantage that burs and stones run true, which was not always the case with the chuck type. The burs and stones seat firmly in the tapered socket.

Ⓐ washable, waterproof adhesive tape for permanent applications can be painted to match the work to which it is applied.

### PORTABLE POWER HACK SAW HAS VARIETY OF USES

Designed for bench use in tool rooms, machine shops and garages, a portable compact power hack saw permits the use of the new high-speed hand frame blades and possesses operating advantages not found in the heavier machines. Round or square stock up to three inches can be handled and a uniform feed pressure is applied during the entire cut. This equipment is mounted on a base twelve by nineteen inches and, with its one-sixth horsepower motor, weighs only fifty-eight pounds. Thus, where long heavy bars are to be cut, the saw can be moved to the work instead of moving the work to the saw.



Bauer & Black  
2500 S. Dearborn

Ob. B. Rodgers Mfg. Co.  
2381 E. 27th St. Los Angeles, Calif.

The Dental Specialty Co. 222 Republic Bldg Denver, Colo

Angeleno, Calif



D1229

# The LURE of



*Jig Saws, Block Puzzles and Cross-Word Puzzles  
All Require Patience and Persistence*

**C**REATE an original puzzle and you can command the world. An absolutely new puzzle is one of the rarest things in nature and will bring more people to the inventor's door than any mouse trap ever conceived. Realizing this, thousands of "part-time" puzzle inventors burn the midnight oil in pursuit of the elusive idea that may bring fame and fortune.

Puzzle inventing has become one of the most popular pastimes of the day with the result that manufacturers are constantly besieged with ideas for "new" puzzles. The reward is a royalty contract or an attractive sum for the outright purchase of the idea, but while many come few—very few—are chosen.

"There's nothing new under the sun" applies more aptly to puzzledom than al-

most anywhere else, for the majority of the puzzles which have enjoyed more or less popularity in modern times can be traced in some form to an ancient origin. One of the favorites that bobs up now and then is the fourteen-fifteen puzzle.



D/229

# PUZZLE *Inventing*

*Albany, N.Y.*

*Embroidery Co.*

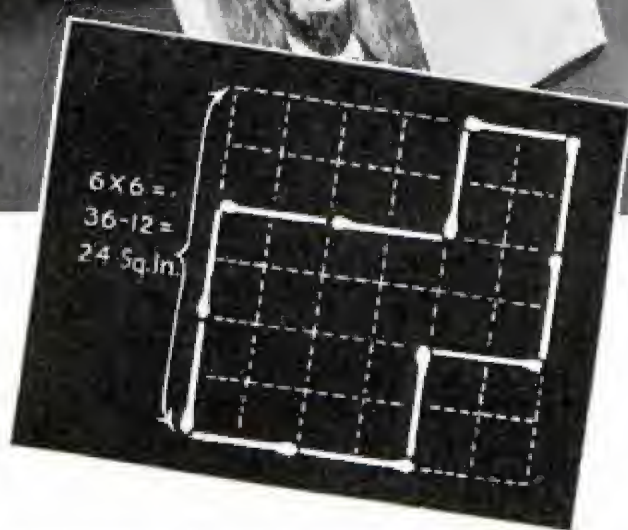
Painting Portrait of Lincoln for Jig Saw; Example of Magic-Square Puzzle; Can You Rearrange the Twelve Matches to Enclose an Area Only Half as Large? Solution on Next Page

14-15

*Erism - Greenman Co*



*Optar & Ordinaire Long Island City, N.Y.*



This consists of a box of numbered blocks placed in consecutively numerical order with the exception of fourteen and fifteen, which are reversed, the puzzle being to move the blocks around in the box, using for this purpose the vacant sixteenth space, until all the numbers lie in consecutive order.

This puzzle started a sensation in this country in the sixties of the last century, but, in a changed form, it is as much a sensation at the present moment when a game called "Imp," obviously the fourteen-fifteen puzzle, is absorbing the attention of the puzzle fans. The difference between the old and the latest puzzle is that the

blocks in Imp cannot be removed from the box, being engraved metal blocks which are moved about by sliding them over metal "rails" fixed in the box.

A mathematician has estimated that the fourteen-fifteen puzzle contains 1,300,000,000 possible combinations. Imp is said to have been started in 1932 in Paris when an Austrian devised the idea of making the game foolproof against the player who, exasperated at some point during the game, is strongly tempted to take the required block out of the box and put it

*New York City*

*Start: Western*

*Modern Brands Inc.*



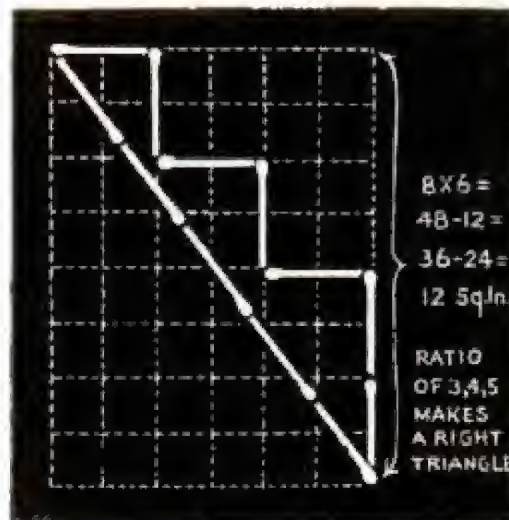


*Anagrams and "Imp,"  
Two Popular Types  
of Puzzle; Eight Per-  
sons Inherit a Piece  
of Land Shaped Like  
the Black Area Be-  
low; Divide It Even-  
ly; Solution to This  
Puzzle and One on  
Preceding Page at  
Bottom*

where it belongs. Within a year he was selling the game at the rate of a million a month and four factories were kept active turning them out.

An authority of many years standing says most puzzle inventions are based on the theory of inversion, that is, knowing the answer and then creating the question.

An example is the famous question propounded by the late Sam Loyd and believed by him to be his most popular puzzle: "How old is Ann?" Here's the way it went: "The combined ages of Mary and Ann are forty-four years. Mary is twice as old as Ann was when Mary was half as old as Ann will be when Ann is three times as old as Mary was when Mary was three times as old as Ann." Now, we ask you, "How old is Ann?" A variation of this is the problem: "I am twice as old as you were when I was as old as you are and when you are as old as I am, together we will be sixty-three." The answer is that I am twenty-eight and you are twenty-one. Breaking the proposition up, we first tackle: "I am twice as old as you were when I was as



old as you are," and decide that since I am now twenty-eight I am now twice as old as you were—fourteen—when I was your present age—twenty-one, that is, seven



years ago. Now, for the second part, "When you are as old as I am, together we will be sixty-three," we find that when you, who are now twenty-one, reach my age of twenty-eight, that is, seven years hence, I'll be thirty-five and the total of our combined ages, twenty-eight and thirty-five, will equal sixty-three.

Inventing a puzzle calls for more than a pencil, a sheet of paper and an idle evening. Mathematical training, particularly in geometry and algebra, and natural mechanical leanings, as well as a habit of exact, logical thinking and natural cunning, are prime requisites of a successful puzzle inventor. Most puzzles have a mechanical basis, be it arithmetical, algebraical or geometrical, and many involve such devices as moving counters, mazes, route puzzles and "crossing river" problems. Coins, matches, string or wire are some of the materials used in puzzles of this class. There is also another type of puzzle known as the "literary" class, which includes conundrums, riddles, enigmas, charades, rebuses, palindromes, anagrams, word squares and cross-word puzzles. Puzzle fans generally belong to one group or the other; it is rarely that a puzzler excels in both.

Puzzle inventing has been described as a mixture of inspiration and science. The late Sam Loyd, reputed to have introduced more than 10,000 puzzles which reached more than 30,000,000 persons during his lifetime, believed that good puzzle ideas usually develop casually, more or less by chance, and his experience was that most people prefer puzzles calculated to inspire controversy.

Loyd's procedure in inventing a puzzle was first to decide in what general class of puzzles his puzzle "germ" belonged. If it involved pieces he shifted blocks around and around until some idea occurred to him; if he was thinking of a conundrum, he reviewed all other conundrums which already had been published; if a diagrammatic puzzle was in the making, he worked over a number of other diagrams. In all this his idea was to get the mind operating along definite lines.

The successful puzzle must be simple, yet prod the mind, and the conditions must be clear, accurate and capable of solution.

(Continued to page 128A)



Model Sunlight Motor Actually Produces Electricity; Note Sensitive Plates at Left

### MOTOR OPERATED BY SUNLIGHT PRODUCES ELECTRICITY

Sunlight falling on metal plates coated with sensitive, photo-electric material is used as a source of power for a miniature motor to generate electricity. An output of four milliamperes is obtained, sufficient to spin a rotating armature four inches in diameter and weighing three ounces. The only factor that prevents wider application of this means of transforming sunlight into electricity is the expense of the coating materials for the plates. Getting sufficient output is a matter of increasing the area of surface exposed to sunlight.

### HOT-WATER PLANT REGULATOR REPLACES EXPANSION TANK

Replacing the expansion tank in hot-water heating systems, an automatic control valve maintains the proper pressure with safety. Due to its sensitive diaphragm, the valve will not open until the exact pressure for which it is set is reached and it will close within a



drop of two pounds. This results in economical operation. A by-pass is provided for quickly filling the system and for making cold-water pressure tests at any time.

Pearless Control Co  
7522 Meade

Pittsburgh, Pa.



D1346  
24

Productions, Ltd  
Castroville, Cal. Canada



*Widely used*  
Pulling Trigger of This Odd Weapon Releases the Arrow; It Was Used by the Crusaders

### BOW-GUN OF CRUSADERS' DAYS RECALLS ANCIENT WARFARE

Recalling ancient means and methods of waging war, a bow-gun from the days of the Crusades has been found in a collection of weapons in California. The bow-gun first came into use on the Continent in the fifteenth century and was carried by the Crusaders to the Holy lands while England was still using the long-bow. The weapon, believed to be at least 500 years old, has a metal bow mounted on a heavy stock. The arrows are precipitated by the release of a trigger.

### METAL VULCANIZED TO RUBBER

Rubber and fabrics can be vulcanized to metals and wood by a process that produces an unbreakable bond. Expected to have a wide application in the manufacturing field, the process employs thermoplastic rubber, the composition material that is subject to application of heat and at high temperatures is quite plastic. Having the characteristic of being solvent, it may

be used to form lacquer, varnish or a shellac substitute. The material possesses pronounced dielectric properties. Of outstanding importance is the plan to develop a metal-reinforced rubber tire for trucks and buses. Other applications include: auto running and floor boards, power and conveyor belting, train and high-pressure hose, unbreakable battery boxes, insulated steel roofing, molded tool handles and paving materials.

### LIFE PRESERVER HAS "CABIN" TO PROTECT HEAD

One de luxe life preserver recently devised is made in two sections, the upper part consisting of a "cabin" which protects the head of the user. It is of inflated rubber and if

one section becomes useless, the remaining one will keep the user afloat. On top is a pole and flag to attract attention.



*General Delivery*  
Inflated Rubber Life Preserver with an Upper Section to Protect the Face and Head

*My Carlton Groah*  
*The Thales Company*

*Owned by Clyde Brown  
Los Angeles Calif*  
*Chas. R. J. Reaney  
Castroville, Calif*

*Dec 1934*



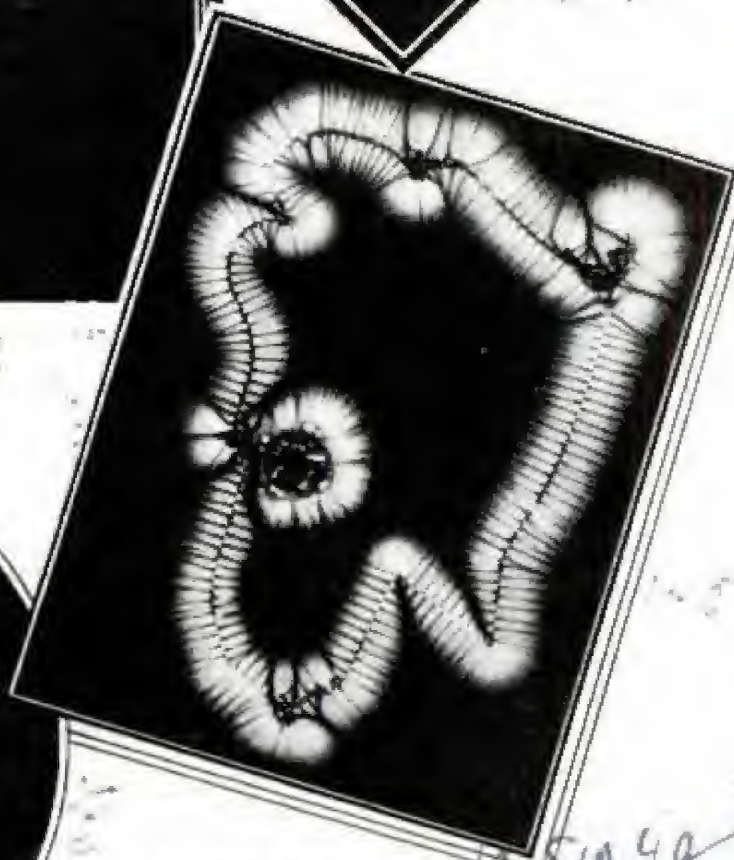
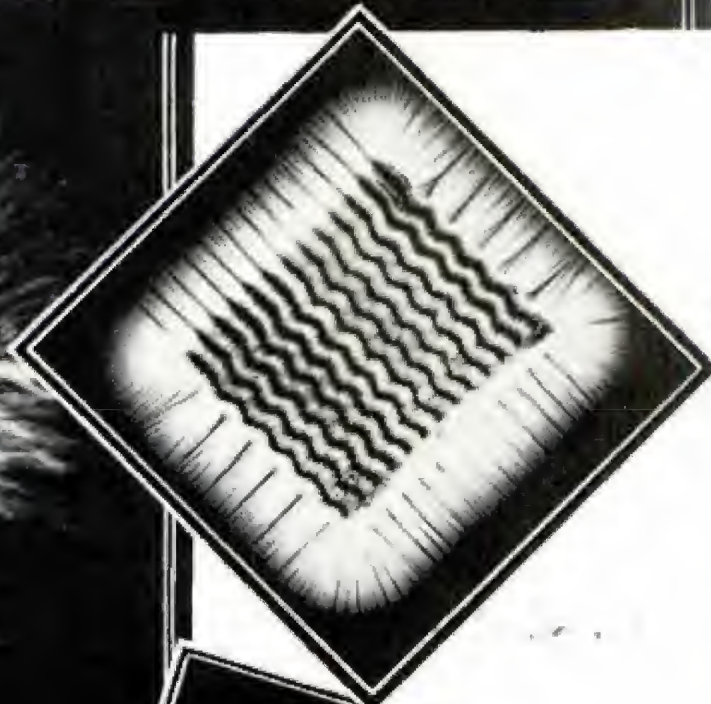
D1339

Made by: Olden W. P. G.  
Leonhardt, Charlottenburg  
Kresmann

# HIGH VOLTAGE



Above, Gold Cross and Its Beautiful Corona  
Photographed with Aid of 140,000 Volts,  
and Design Made by a Silver Cigaret Case



Courtesy Publishers' Photo Service

These Photographs Were Made by Passing from  
140,000 to 250,000 Volts of Electrical Current  
through the Metal Objects Pictured; Don't Try a  
Similar Stunt Unless You Are Thoroughly Familiar  
with Electricity; at Left Are Ordinary Metal Paper  
Clips Exposed to 250,000 Volts, and Above Is a  
Gold Necklace

10504a th  
New York





This Piece of Cloth Which Has Been Fireproofed Is Being Tested by Placing It in Flame

### FABRICS ARE MADE FIREPROOF BY SECRET TREATMENT

Fabrics are being fireproofed by a secret treatment which it is claimed renders them impervious to flames but does not affect their normal qualities otherwise. Fabrics thus treated have been used in building airplanes and fireproofing partitions in ships. The fireproofed cloth can also be used for clothing and for pillow cases and sheets in hospitals and on ships.

### DRAWINGS EASY TO REPRODUCE ON THE MIMEOGRAPH



ograph by using a new device. Set in the frame is a sheet of translucent glass through which a light shines. An adjustable reflector can be used to vary the in-

tensity of the illumination on any part of the surface. The blueprint or drawing to be reproduced is clamped on top of the glass. A translucent, flexible writing plate is fastened on top of the blueprint or drawing and the stencil is fixed in place. When the light is turned on, every detail can be seen clearly through the stencil, making it easy to cut the stencil with the various tools provided. When cut, the stencil is run off on the mimeograph in the usual way.

D1336

### FIRST AUTO MADE IN ALASKA GOES TO MUSEUM

Alaska's first homemade automobile, built from odds and ends thirty years ago, will no longer gather dust in an obscure corner of a Juneau garage. A place of honor now has been reserved for it in the Territorial museum at Fairbanks. The car was built by Robert E. Sheldon, then living at Skagway, but now postmaster at Fairbanks. Mr. Sheldon had never seen an automobile, but in 1905 he found a description and some drawings and photographs of the new invention in Popular Mechanics Magazine, and decided he would make "one of those horseless carriages." The present governor of Alaska,



Alaska's First Homemade Auto Which Was Constructed by Man Who Had Never Seen a Car

then editor of the Skagway newspaper, often saw Mr. Sheldon driving along the streets of the town, which was the gateway to the Klondike. Like the racing Panhards and Wintons of that day, the car was painted a brilliant red. The tires were made of hard rubber, and the engine was

American Clipper  
Fair American Airways

A. B. Duck Co  
720 W. 1st St  
Juneau

71st Street  
Juneau  
335 W. 1st St  
Juneau



covered with a sheet of heavy zinc. Power was furnished by a single-cylinder, two-cycle marine engine, with a friction clutch. The car had a wooden frame, with old-fashioned buggy wheels and springs. Instead of having a steering wheel, it was equipped with a long handle.

D1359.

### "MITTEN" PREVENTS FREEZING OF WATER METER

Basement or indoor water meters can be protected from freezing with metal "mittens" for covering and insulating the meters. The mitten also prevents rapid loss of heat by the water within the meter. It consists of a flexible jacket of expanded, galvanized and painted metal shaped to fit around the meter and leave space for insulating material. The insulation used is a mineral wool which is waterproof, vermin proof and will not decay. The jacket, with a thick layer of wool in the bottom, is placed around the meter and the sides clipped shut, then more of the wool is placed around the sides and top and pressed down. The sides of the jacket open to permit it to be slipped up over the pipe and meter couplings.



D1328

### ARTICULATED TROLLEY CAR HAULS MORE PASSENGERS

Germany is experimenting with an articulated trolley car consisting of three street cars in one. The unit has only one conductor. Passengers can enter at front

Conk. Watkins.



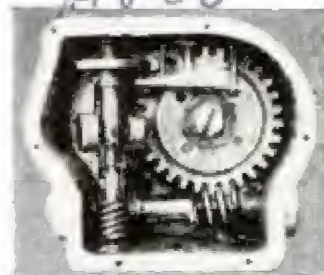
Interior and Exterior Views of Germany's Articulated Trolley, Consisting of Three Street Cars in One

or rear and leave by the middle compartment door beside which is the conductor's stand. Seats are arranged both crosswise and lengthwise.

D1302.

### DOOR CHECK WITHOUT FLUID IS REGULATED BY GEARS

Regulated by gears, a new door check operates without fluids. Danger of leakage is eliminated, as is faulty operation in cold weather on account of thickening of the fluid. Inside a gear is a catch that slips when the door is opened. When the door is released, the catch engages with the gear. A governor regulates closing speed.



now available at present. 12/14/34

J. L. Kuhl, Beatrice, Neb.

Algemeine Elektrizitäts-Gesellschaft.  
Berlin & Niederich-Karl-Lufer 2-4.  
Germany



D 1243 Mr. Robert W. Leonard  
The Infantry Journal  
1115 17th St N.W.

# The PRESIDENT

Washington 10 C



speaking. With a copy of their schedules before them, representatives of these networks get together with the President's secretary and arrange a time suitable to the President, that will interfere as little as possible with commercial programs.

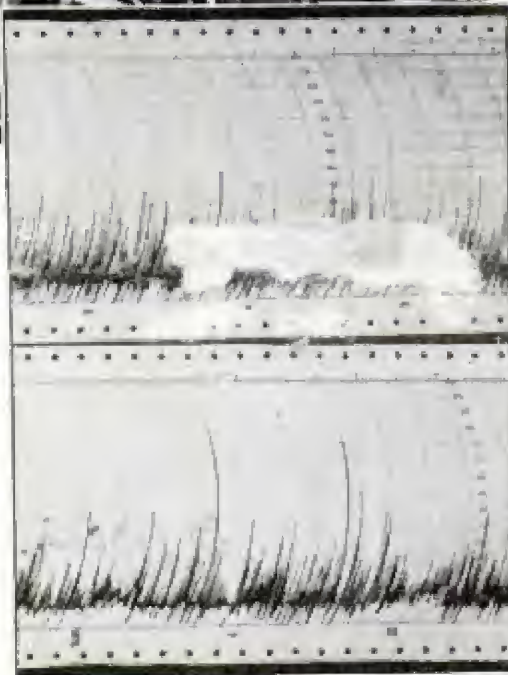
A special desk for these "fireside broadcasts" has been arranged by radio technicians. It is an ordinary flat-top desk from which the drawers have

*The President at the Microphone and, Left, a Sound Record of His Voice, Above, Compared with That of Ed Wynn, Comedian; Below, Broadcasting Review of Fleet*

**I**N 1919, when President Wilson wished to appeal to the people on the League of Nations issue, he traveled 9,981 miles between September 3 and 23, making twenty-three scheduled speeches. Joseph P. Tumulty, then his secretary, estimates that on this tour, which wrecked the late President's health, 750,000 persons heard his voice.

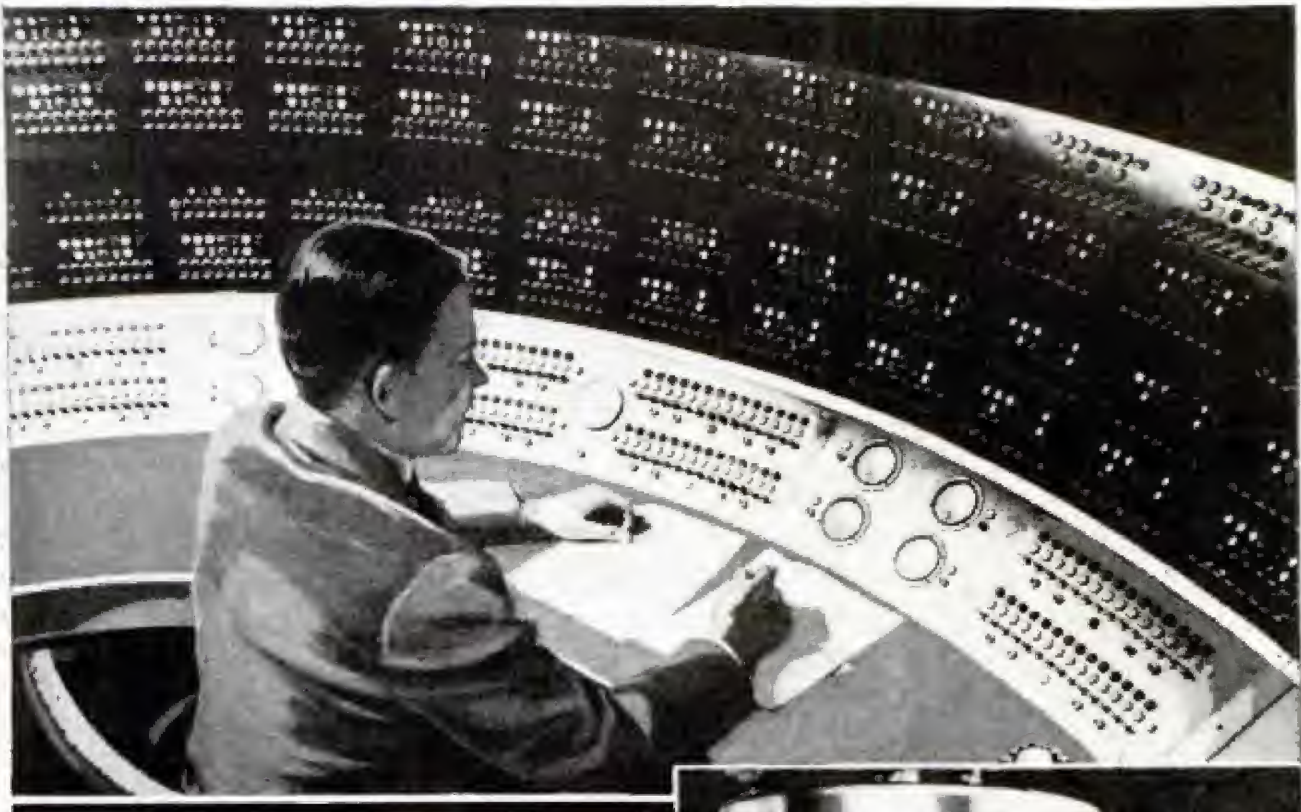
Compare this with 1934 when President Roosevelt sat before the microphones at his desk in the White House, and in twenty-seven minutes addressed fifty million persons, all of them sitting comfortably in their own homes. "What a tragedy," comments Mr. Tumulty, "that radio could not have been developed fifteen years sooner."

When the President desires to broadcast he notifies the three great networks—Columbia, N.B.C. and the new A.B.S.—stating the approximate time he desires to





# on the AIR.....



*The Control Board, Heart of a National Network,  
and Mercury Vapor Rectifier Supplying 18,000  
Volts to Radio Power Tubes*

been removed. Five microphones—two for N.B.C. and A.B.S. and one for Columbia—are arranged in a semi-circle on top of the desk, which is placed in the oval diplomatic reception room of the White House. Cables from the microphones pass through two holes in the top of the desk to the floor, where they pass around the edge of the room to the portable amplifiers on the opposite side.

The telephone company arranges direct lines from the amplifiers to WRC, WJSV and WMAL, where connections are made by leased wire to the New York control rooms of the three networks. From here leased wires, leading to all stations of the networks, are plugged in. Columbia has 100 stations on its hookup, while there are eighty-seven on N.B.C. With the various independent stations plugging in at the nearest network station, there are over 250 stations ready to broadcast the President's address. As an experiment, an official of N.B.C. who possesses a radio of such range that he can select over 100 sta-





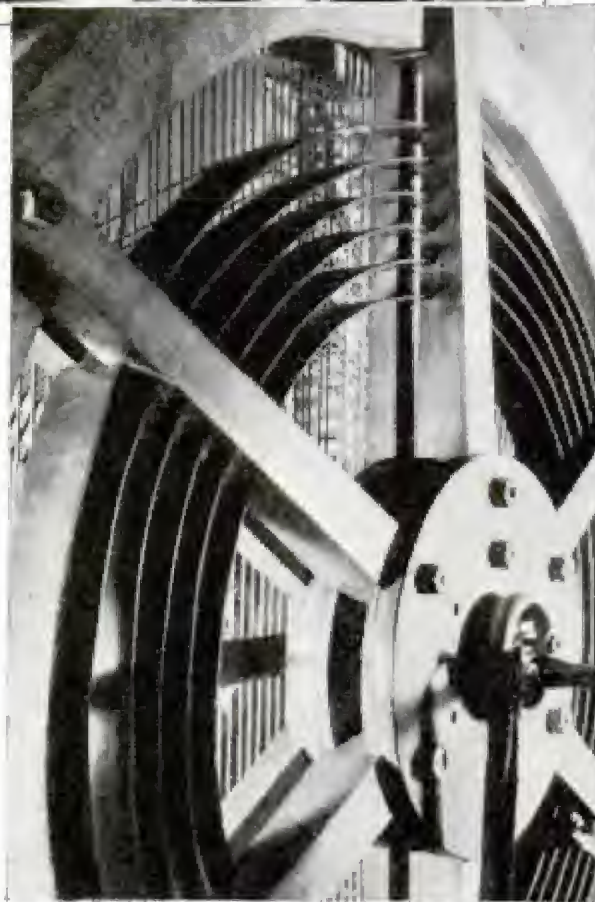


*The President Broadcasting from His Radio Desk in the White House*

tions, tried the complete range of his dial during the President's latest speech, and found only three stations broadcasting other programs.

President Roosevelt invariably dictates his speeches to a secretary. After they are typed he makes revisions, reading the broadcast direct from the second typing, which is identical with copies released to the press.

Carleton Smith of N.B.C. and Bob Trout of Columbia are the official presidential announcers. Each of these men composes a short introductory speech, concluding with the words, "Ladies and gentlemen, the President of the United States." Each announcer rehearses his speech aloud several times, checking with a stop watch. These times are compared, and the longer introduction is cut so that both will take approximately the same number of seconds to deliver. The announcers have their individual microphones located at opposite sides of the President's desk.



*Center, High-Power Frequency Transformer; Below, Rear of Control Board of N.B.C. Network Where Hundreds of Wires Are Centered*

When a station is on the air there can be no vacant time; and since no requirement is made that the President speak a prescribed number of minutes or seconds, an orchestra at the New York studio stands by ready to take the air and finish out the time with music until the next scheduled broadcast.

When the Presidential broadcast is going on, the diplomatic reception room contains the two announcers, ten radio technicians, and such personal friends and members of the family as happen to be present in the White House. As soon as the speech is finished news pho-



tographers are admitted to take stills, and the cameramen grind away while the President reads the selections of his speech that will be heard by movie goers.

The magnitude of such a broadcast may be judged by the power used, 2,500,000 watts being required. This wattage would light every home in a city the size of Concord, N. H., or Greenville, S. C., for half an hour. The horsepower used is enough to lift the seventy-story RCA building in New York 1,265 feet. More than 1,500 people are necessary in order that such a hookup may go over without a hitch.

### TELEVISION AERIAL IS SHAPED LIKE A BIG WHEEL

German radio engineers experimenting with television have evolved a strange form of aerial for picture transmission by wireless. This aerial takes the form of two circular frames with wire "spokes" attached to the rim of each "wheel" and leading to a central "hub." The aerial is placed horizontally atop a building.



This Wire "Wheel" Is a Television Aerial Used in Germany in Transmitting Pictures

### PORTABLE PIPE THREADER RUN BY ELECTRIC DRILL

Pipe threading is simplified by using a portable threader operated by any standard make of pneumatic or electric drill.

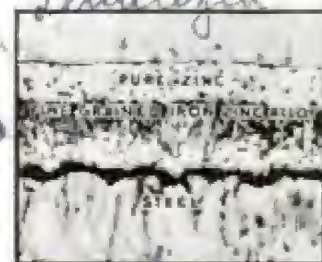


Lightweight Portable Pipe Threader Which Can Be Operated by Pneumatic or Electric Drill

Made mostly of aluminum alloys, the threader weighs only twenty-nine pounds and the detachable base weighs sixteen pounds. It can be used with or without the base. Standard one-inch pipe fits holes in the feet of the base to form a substantial permanent work bench if desired. The operating speed of the die head is ten to fifteen revolutions per minute and the threader will cut right or left hand threads and is reversible for backing off.

### EXTRA ZINC COATING ON WIRE STOPS FENCE RUSTING

Protection against rusting of wire fence is obtained by coating the wire with an extra coating of pure zinc. Every part of the wire is covered with the special galvanizing material, preventing moisture or salt air from reaching the steel wire. The process does not permit formation of the hard, brittle iron-zinc alloy with which many kinds of fence wire are covered. The brittle alloy has a comparatively short life, particularly in regions where it is subjected to the deteriorating effects of salt air.



*The Burden Co.  
1934 Barkley  
Road  
Warren  
Ohio  
Pipe Tools and  
Hardware  
Warren, Ohio*

*D1234*

*D1360*

*Northwestern Barb  
Wire Co. & Hardware Co.*



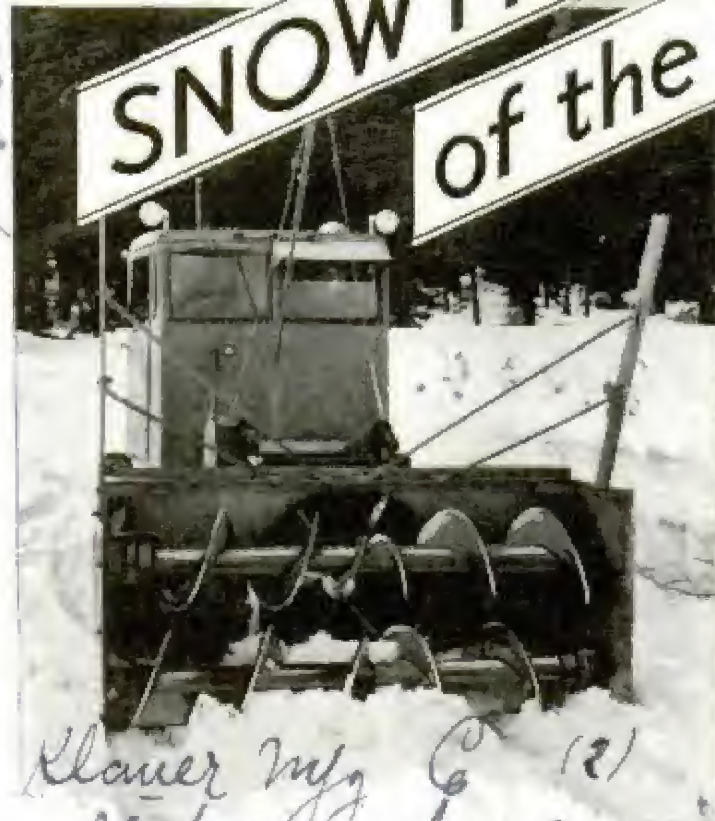
Highway Dept.  
State of Washington

D1338



Snowplow Clearing Roads in  
Cascade Mountains and Short-  
Wave Radio Station Which  
Directs Operations

# SNOW FIGHTERS of the CASCADES



Klauer Mfg. Co. (2)  
Dubuque, Iowa

Radio Helps Keep Mountain Roads in the  
Cascades Clear of Snow by Fording a Means of Com-  
munication between Snow Camps and Trucks;  
over the Short-Wave Set Extra Aid Can Be Sum-  
moned in Case of a Sudden Blizzard, and Slides,  
Weather Conditions and Breakdowns Are Re-  
ported; Above, Snowplow, Showing Radio Anten-  
na; Right, Radio Set in Truck



comb. L. & Paterasom, 740 N. 1st Ave.  
N. Seattle, Wash.



D/284

W. L. Clayton  
Kansas City S. & R. R.

# Rolling Crane Removes Trucks from Wheels

Freight-car repair work is simplified by using a small manually operated bridge crane to remove trucks from car wheels and replace them. The crane, made of two-inch pipe, bent and welded in shape, is the invention of a Kansas City, Mo., car foreman. It is easily rolled into position on its own wheels by two men. Despite its wide spread of ten and one-half feet at the base it is able to lift a weight of one-half ton from three points of suspension. The crane is moved out in raised position and when set in place over a track, the entire top framework is lowered by a series of pull jacks. When the trucks are fastened by chains, the top frame is raised and the entire device pulled from the car wheels. The crane can then carry its load any desired distance. It works equally well with the operation reversed.



This Rolling Crane Is Used to Remove the Trucks from Freight-Car Wheels in Making Repairs

2201 Park Ave  
New York City

Baker-McMullen Co.  
1100 Sweetgum Ave. Akron, Ohio

## LATHE ADAPTED FOR MILLING BY HEAD ATTACHMENT



After turning has been completed, the lathe can perform milling operations by equipping it with a new attachment that does not require removal of parts in changing from one job to the next. Spur or spiral gears can be

made with the attachment, as well as cutters and hobs for milling.

## SECRET MESSAGE TO SQUAD CAR SENT BY PLUG-IN PHONE

To prevent criminals from tuning in on police flashes to squad cars, the Buffalo, N. Y., police department has equipped its cruising cars with plug-in phones. When a secret message is to be transmitted, the police radio dispatcher asks a squad to

call headquarters. The squad car goes to the nearest patrol box, plugs in the telephone in the bottom of the box without even opening it, and receives the message.

## PAN COVER KNOBS ATTACHED BY TAPPING WITH HAMMER

Pan cover knobs often become loose and drop off, leaving the covers virtually useless. Such a cover can now be repaired in a few seconds by replacing the original knob with a patented one which can be attached with a tap of a hammer. Each knob is equipped with a split rivet, the prongs of which spread when it is driven into the knob, giving a secure fastening.



It is estimated the average healthy person eats one ton of food costing about \$200 every year.

Culver Engineering Co.  
1428 N. Skrine Ave. Chicago

636 N. Albany  
Chicago

Carl John Winters Fleming  
240 Wallace Ave  
Buffalo, N.Y.



D1094 Cont. John L. County  
 5107-19-4-11-11  
 Washington  
 200

# WASTE OR



Map Shows Plan of Tennessee Valley Project with Present and Proposed Dams; Above, Lifting One of Giant Water Pipes in Place at Boulder Dam

**A**PPROXIMATELY one billion dollars is being spent by the federal government to develop the hydroelectric resources of the nation. This vast sum is split among nine vast plants. These plants stretch from northwest to southeast and from southwest to north central United States.

The greatest is Muscle Shoals or the Tennessee valley development. Here the

government has projected an outlay of some \$300,000,000.

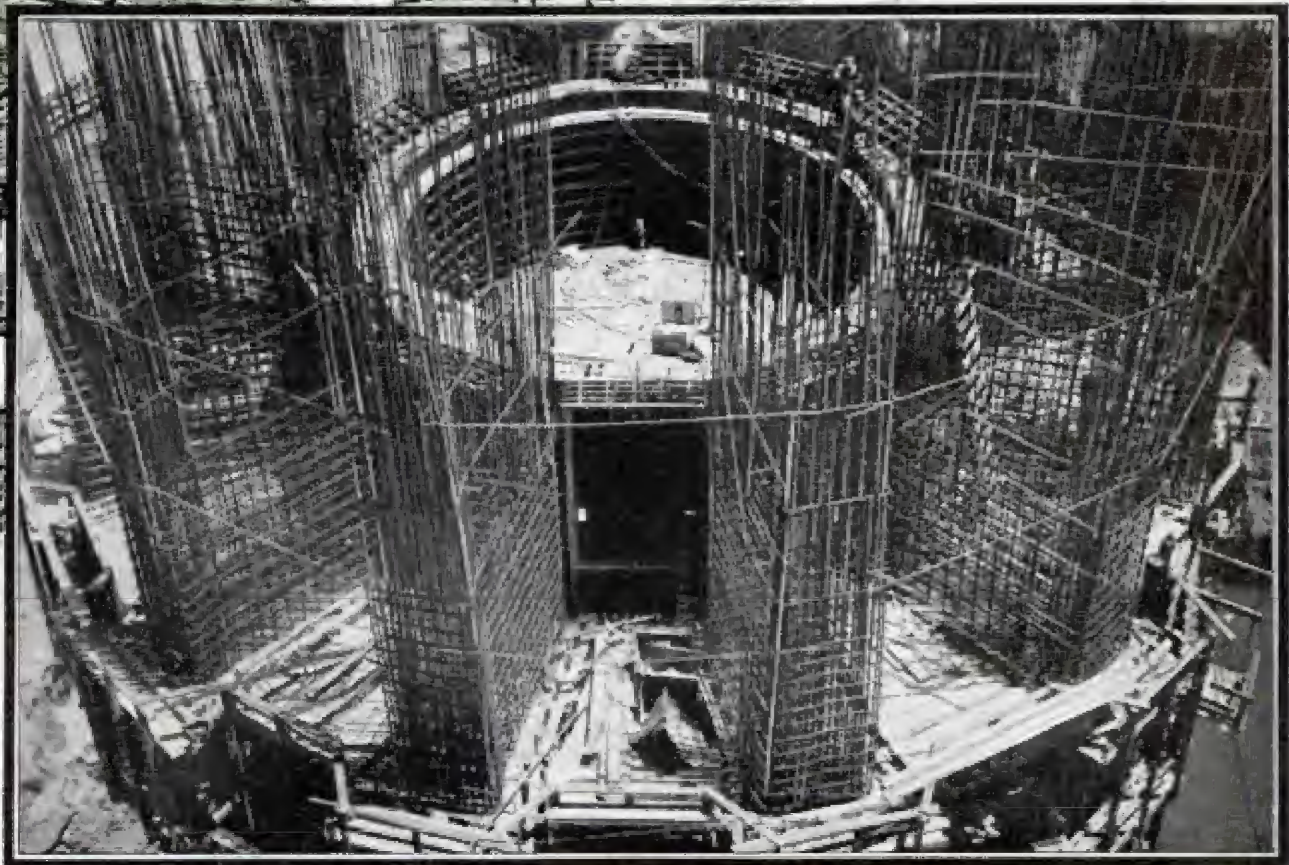
Boulder dam, on the California-Nevada border, draws \$165,000,000; Grand Coulee, in Washington state, calls for an expenditure of \$63,000,000; Bonneville, in Oregon, \$43,900,000; Fort Peck, in Montana, \$59,000,000; Verde, Caspar-Alcova and Owyhee, in Arizona, Wyoming and Idaho-Oregon respectively, \$49,600,000 and Loup



# PROGRESS ?



*Below, Intake Tower under Construction at Boulder Dam*



river, Nebraska, \$7,300,000. Supplement the foregoing figures with the initial cost of Muscle Shoals—\$150,000,000—and \$140,000,000 advanced to states and municipalities plus the subsidiary program cost of TVA and the total hovers around one billion dollars.

For sheer magnitude of undertaking and results expected the TVA program surpasses all the other ventures. Two great dams are being built here in addition to the one already existing—the Wilson dam. Wheeler dam, located fifteen miles above Wilson dam, will provide a storage lake





Above, Plan for the Bonneville Dam in Oregon; Below, Boulder Dam When About Half Finished

eighty miles long. Norris dam, 400 miles distant up the river, beyond Knoxville, will span the river 1,800 feet and contribute power by transmission line to the Muscle Shoals plant.

The Grand Coulee dam in Washington represents the greatest single harnessing of hydroelectric power resources in the world. With a maximum surface elevation at 1,111 feet, the dam will back up the Columbia river about fifty miles in the vicinity of Hunters and three miles up the Spokane to near old Fort Spokane.

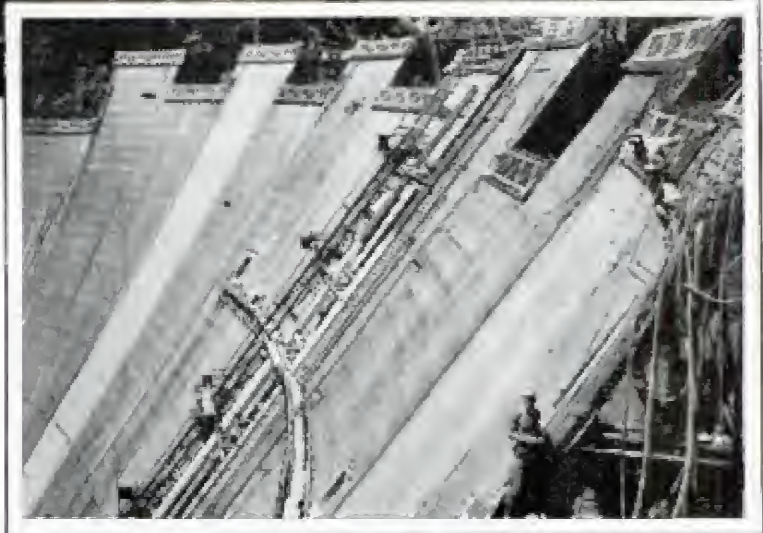


# The BONNEVILLE DAM



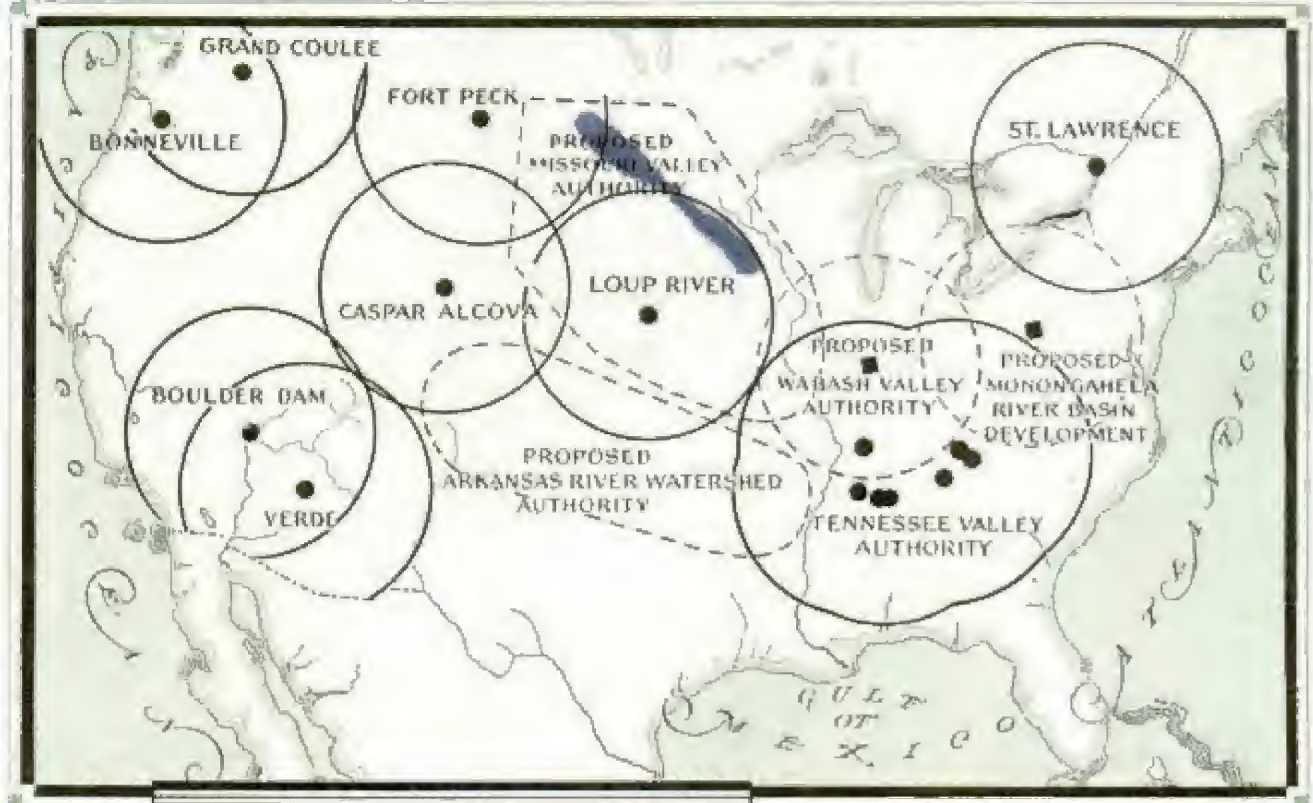
Ultimate development of this dam site calls for the construction of a single concrete gravity dam about 500 feet in height with a crest of 4,000 feet. The dam will create a reservoir of approximately 17,500 acres with a capacity of 1,200,000 acre-feet. An acre-foot is the amount of water that will cover one acre of ground one foot deep.

Boulder dam is to be the tallest dam in the world. It bars the



*Boulder Dam, Looking across the Downstream Face at Top of Forms toward the Nevada Side*





Map Showing Various Government Hydroelectric, Water Control and Irrigation Projects; Left, Wilson Dam Today

way, for the use of man, of the narrow, twisting Colorado river as it pours through its rugged canyon. From its base the dam rises to a crest 726 feet up. Towers and parapets shoot it up another forty feet. The Sautetm now building in France, is only 446 feet high and the Owyhee, in Oregon, is only 405.

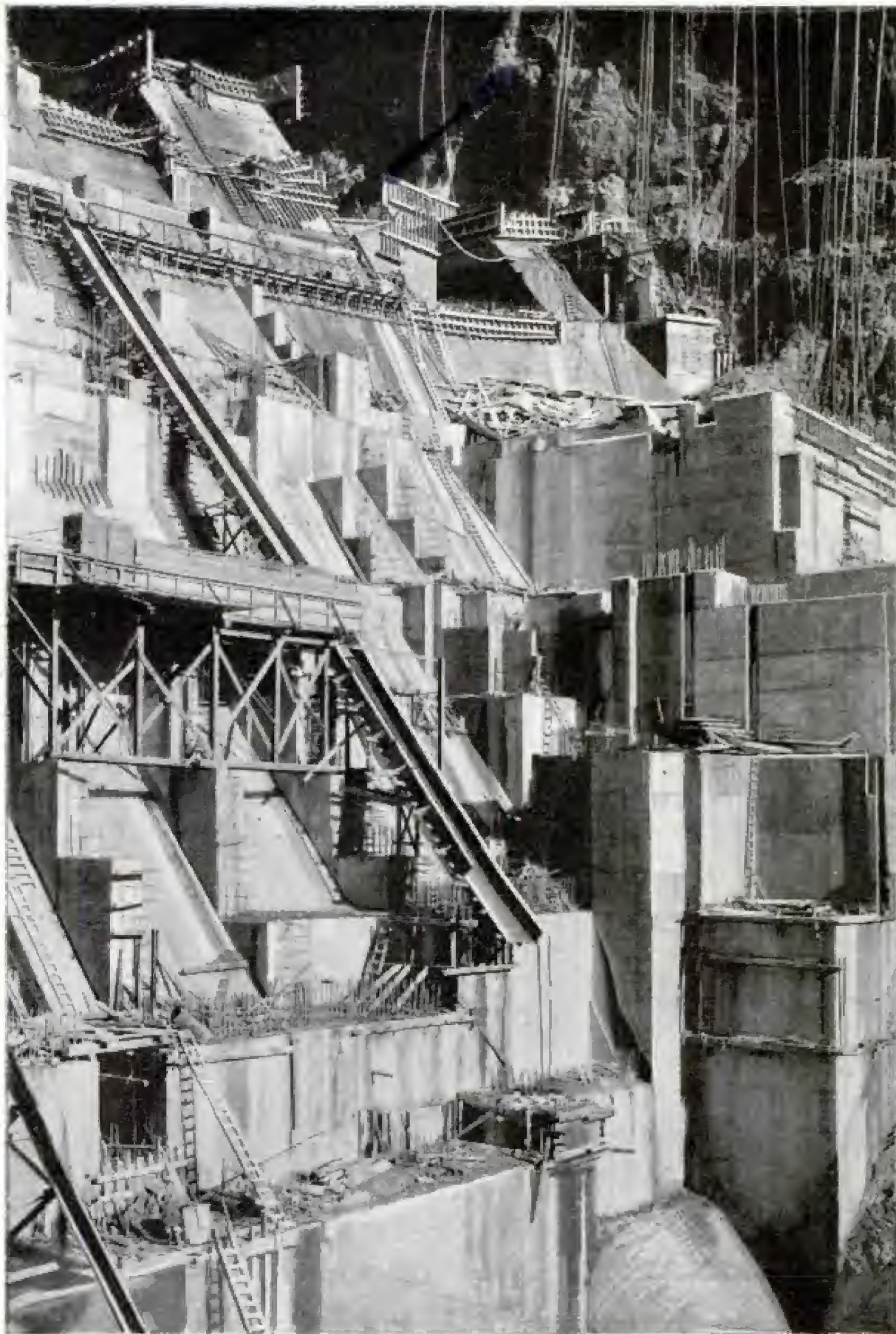
Boulder dam will raise the surface water of the Colorado river 584 feet. It will create an inland lake 227 square miles in extent, containing over 145,000 acres. This lake will hold over 10,000,000,000,000 gallons of water—30,500,000 acre-feet when full. So large will the reservoir be that the entire flow of the Colorado river for two years can be stored in it.

Fort Peck dam, in Montana, will be the largest earthworks dam in the world. It will contain 85,000,000 cubic yards of earth and create a reservoir in the Missouri river 175 miles long with a capacity of 19,000,000 acre-feet. The accompanying map shows the area these various dams will serve

with electric power, the amount of power existing plants in these areas are capable of generating and the amount of additional power the government plants will create. Existing plants in the outlined areas have a total yearly capacity of 35,089,764,000 kilowatt hours. A kilowatt hour is the amount of work one kilowatt performs in one hour of time. The government's program will add to this sum total 19,687,480 more kilowatt hours, making a grand total of power production for the areas of 54,777,244,000 kilowatt hours per year. This is three times as much power as was consumed in these areas for the fiscal year 1932. That figure is 18,481,085,500 kilowatt

(Continued to page 124A)





**Boulder Dam in the Making; It Will Be the Tallest Dam in the World and Its Reservoir Can Store the Entire Flow of the Colorado River for a Period of Two Years**



D 1888

John Lewis Jr. 1012 Washington St. Dayton Ohio

Ralph Lettelier

A. J. Spanjers C. 825 10 W. Ave. N.E. Minneapolis



Miniature of a Ketch Which Is Capable of Towing a Rowboat and Passengers When under Sail

**Acme  
MINIATURE OF SAILING CRAFT  
CAN TOW A ROWBOAT**

Working miniatures of a ketch, a cabin cruiser and a speedboat have been built by a Los Angeles man. The six and one-half foot ketch is a miniature of a twenty-six-foot boat, and is capable of towing a rowboat and passengers when under sail.

**SEAL FOR BEDROOM DOORS  
WORKS AUTOMATICALLY**



Fully automatic in operation, a seal for bedroom doors closes the space between the floor and the bottom of the door. The device is installed in the bottom edge, with a plunger causing the seal to

slide in and out. Its operation is noiseless.

**GERMAN SILVER IN NAME ONLY**

German silver is not silver at all but the "white copper" of China which was introduced into Europe by the Germans. It is

composed of four parts of copper, one part of zinc and two parts of nickel, all by weight, the proportions being varied slightly by different makers. Sometimes small amounts of lead or iron are added.

**ZEBRA FISH HYPNOTIZES  
VICTIMS BY WAVING  
ITS FEELERS**

Something very like hypnotism is employed by the strange tropical zebra fish in attracting victims for its dinner. It is equipped with many feelers which wave gracefully to and fro in the water but prevent rapid movement in pursuit of prey. So the striped fish approaches its victims slowly, waving its streamers to attract attention. Apparently smaller fish are fascinated by the feelers and allow the zebra fish to come close. Then there is a gulp and the little fish is gone. Recently 500 other fish were included in the same tank with two zebra fish being shipped to the New York aquarium. When the tank arrived, there were only two zebra fish left. They refused to eat anything but tropical fish and as the



Striped Zebra Fish Which Uses Its Waving Feelers to Attract Attention of Smaller Fish

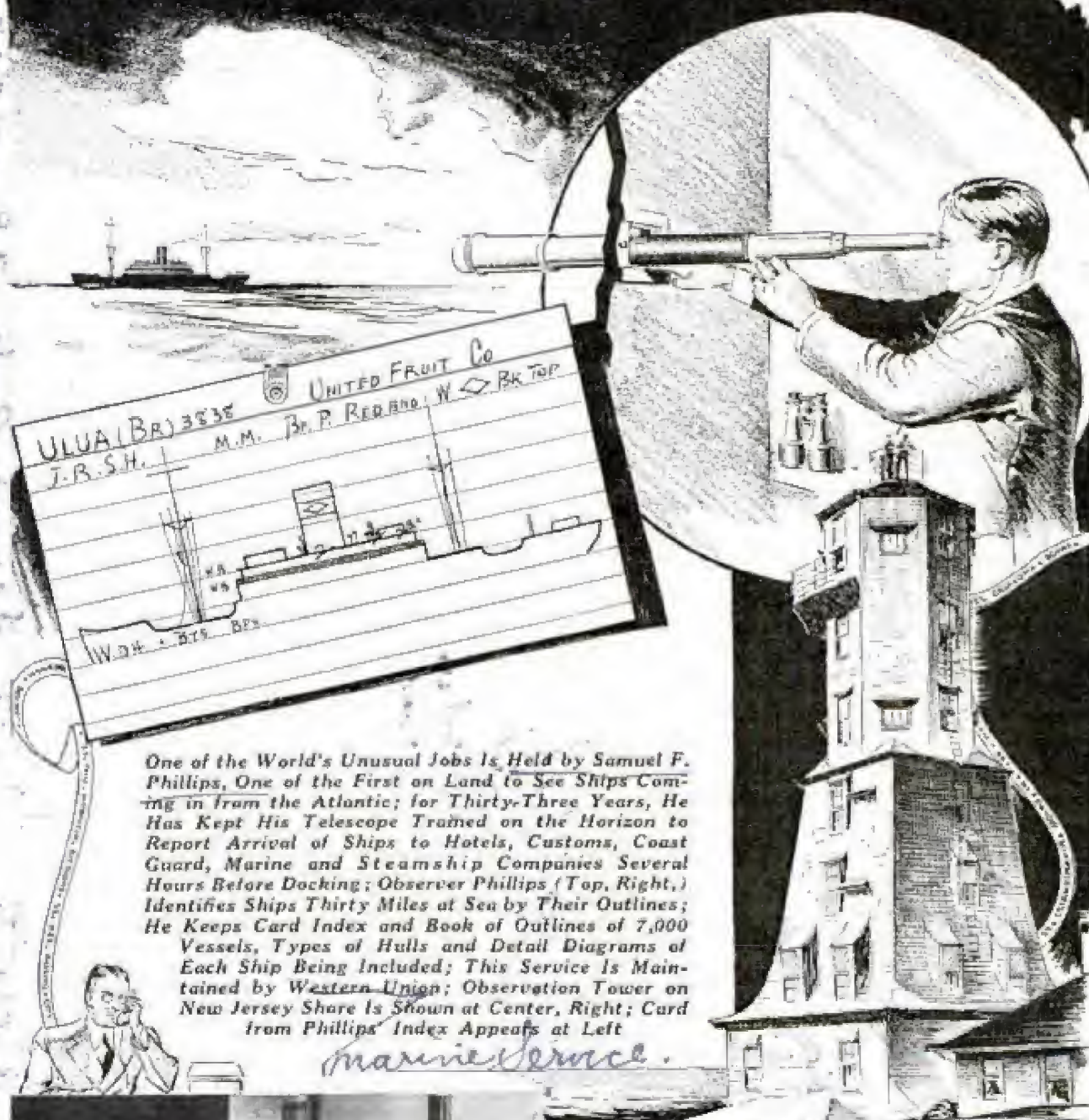
aquarium could not afford to feed the zebras a diet of tropical specimens, they went on a hunger strike and died.



D 1170

News Service Bureau  
Box 497 Dayton, Ohio

# AN AMAZING MARINE JOB



One of the World's Unusual Jobs Is Held by Samuel F. Phillips, One of the First on Land to See Ships Coming in from the Atlantic; for Thirty-Three Years, He Has Kept His Telescope Trained on the Horizon to Report Arrival of Ships to Hotels, Customs, Coast Guard, Marine and Steamship Companies Several Hours Before Docking; Observer Phillips (Top, Right,) Identifies Ships Thirty Miles at Sea by Their Outlines; He Keeps Card Index and Book of Outlines of 7,000 Vessels, Types of Hulls and Detail Diagrams of Each Ship Being Included; This Service Is Maintained by Western Union; Observation Tower on New Jersey Shore Is Shown at Center, Right; Card from Phillips' Index Appears at Left

marine service.



AM. SS. PREST. GARFIELD. PASSING. CITY ISLAND. BOUND. IN. AND

Bottom, Left, Telegraph Office into Which Come Observer Phillips' Reports of Incoming Ships; Immediately This Information Is Flashed to All Points Receiving the Service; Just Above, Facsimile of Ticker Tape Containing Report Telegraphed to New York Office







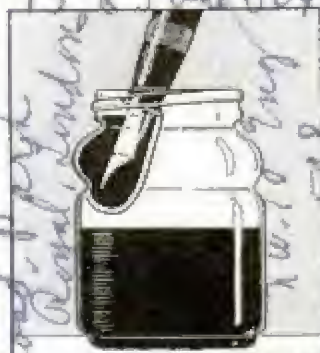
**Auto Being Loaded into Plane for Final Stage of Trip to Interior of New Guinea; Only Windshield and Top Were Removed**

## GIANT AIRPLANE CARRIES AUTO TO NEW GUINEA MINES

An American made automobile recently completed its trip from Sydney, Australia, to Bulolo, New Guinea, by airplane. It was purchased in Sydney and shipped to Lae, New Guinea, by steamer. From Lae, the car, a Dodge, was transported in a large Junker plane to the Bulolo gold mines. The automobile came out of the plane practically ready to be driven away. The only parts that had to be removed to allow the car to be placed in the plane were the windshield and the top.

## INK BOTTLE WITH PEN WELL PREVENTS STAINED HANDS

Fingers are protected from stains in filling the fountain pen or using an ordinary pen by an ink container equipped with a 15-25 mm. BUC - special pen-well.



mersed. In use, the top is tightened and the bottle is turned over with the pen well

W. A. Sheaffer Pen Co

on the under side. Restored to normal position, the well is found filled with ink.

**GREASE GUN OUTFIT  
CARRIED ON BACK  
OF OPERATOR**

Carried conveniently on the back of the operator, a portable grease gun has numerous attachments for doing all kinds of automobile greasing and can be used conveniently in other work to reach lubrication points which otherwise might be all but inaccessible. The grease container is filled

three-fourths full with ten pounds of grease, and is then charged with 100 to 125 pounds of air which can be applied with a hand or foot pump if an automatic air supply is not available. One filling of air empties the tank. When in operation the grease comes up to the gun head under pressure from the tank. By working the handle, the operator causes very heavy



**Portable Grease Gun Outfit Carried on Operator's Back: It Is Charged with Air Before Using**

pressure to be built up in the piston chamber, thus enabling him to open the most obstinate shackles or force lubricant into the tightest bearing.

Names and addresses of manufacturers and dealers in articles described in this magazine will be furnished by our Bureau of Information upon receipt of a stamped, self-addressed envelope.



# Models of Ancient Houses Built from Plans

Accurate in every detail, models of ancient houses have been worked out by the Museum of the University of Pennsylvania so that anyone can build them. One model, from the period of 1400 B.C., represents the home of a nobleman in the time of King Tutankhamen, while from 2200 B.C. is the model of a house at Ur of the Chaldees, the type of home in which Abraham lived. A third model is that of a cloth merchant's home in the Fifteenth Century. Blueprints and cardboard construction materials are available for building these models. Walls and furnishings are printed on water-color paper, mounted on cardboard in large sheets, ready to be colored, cut out and



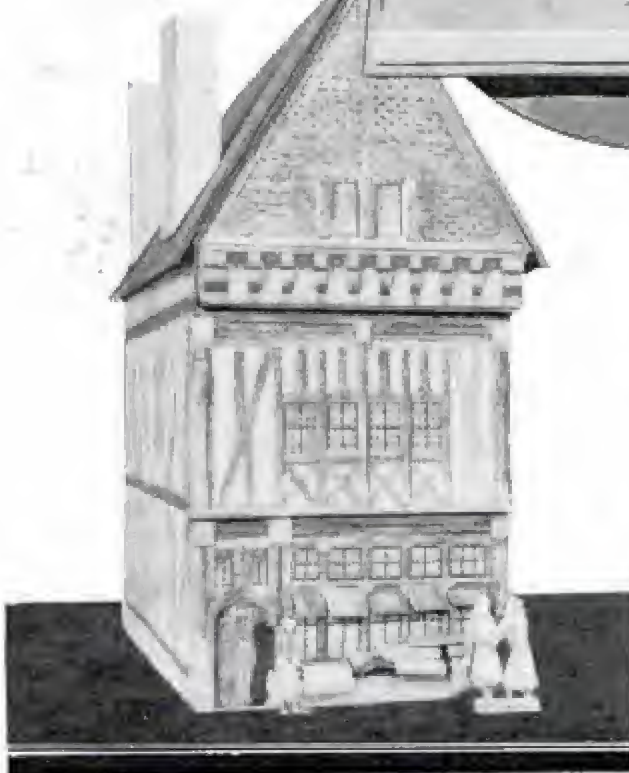
Top and Bottom, Models of Period Houses; Center, Top Removed to Show Furnishings and Decorative Treatment of Walls

set up. Complete description, color notes and directions for assembling, furniture and costume figures to scale are included with each house. The model of the house of 2200 B.C. is available in blueprint cut-out pattern form, to

be constructed of Celotex. The walls are undecorated. Since the models reflect the life of the people of the respective periods, teachers find that they increase interest of students in art, history and architecture.

## COLORED NOTES FOR MUSIC AID IN QUICK READING

German musicians are trying out brightly-colored printed music as an aid in quick reading of scores. Some find the colors confusing and others claim the colored notes are more quickly read. In the colored scores, sharps are printed red, flats are green and the rest of the notes black.



Science Service 10/4/34



D1278. Cont. Don Isidore...  
4 W 103rd St. New York

# SIKORSKY SEES

Dawn-to-Dusk Trans-Atlantic  
Flights by Airliners



Two Views of the Interior of the Brazilian Clipper; Note the Spacious Cabin Space per Passenger as Compared with the Ordinary Plane

THE building of clipper ships for the American merchant air marine is rapidly spreading the fame of Yankee prowess and craftsmanship over the seven seas. The new multi-motored clippers, like their forerunners, the sailing clippers, are built and launched from the granite shores of New England.

The last flying boat launched, the great Brazilian Clipper, smashed ten world records before going into active service. Subsequently, she flew the round-trip between Buenos Aires and territorial United States, returning in five days, including overnight stops! That is a record to conjure with. With one stroke, this feat has made America mistress of the ocean airways as England is mistress of the high seas.

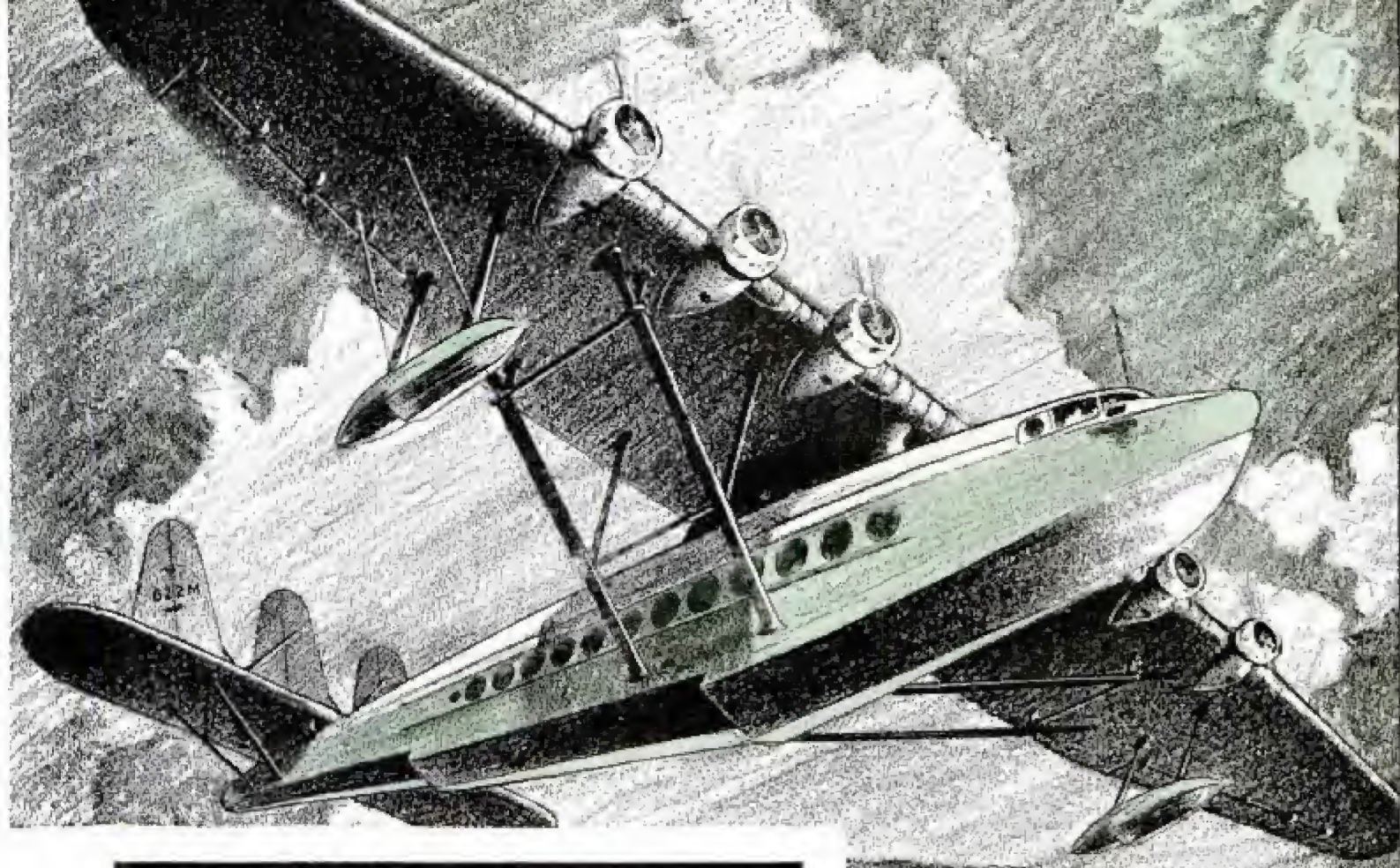
While the Brazilian Clipper was out



smashing records and receiving the acclaim of two continents, the proudest man alive was her designer, I. I. Sikorsky. In an exclusive interview with Popular Me-

Sikorsky Aviation Corp., Bridgeport, Conn.





*Drawing of the Proposed 100-Passenger Atlantic Clipper and Col. Charles A. Lindbergh at the Controls of the Brazilian Clipper*

D1298

chanics, Mr. Sikorsky discussed plans for a new 100-passenger clipper ship which is occupying him and his associates.

"Present-day practice among air lines operating over land has resulted in the creation of fast planes carrying ten to fourteen passengers," he said, "but the experience of air lines operating transports over ocean stretches seems to dictate another solution, the use of multi-motored flying boats with large passenger-carrying capacity.

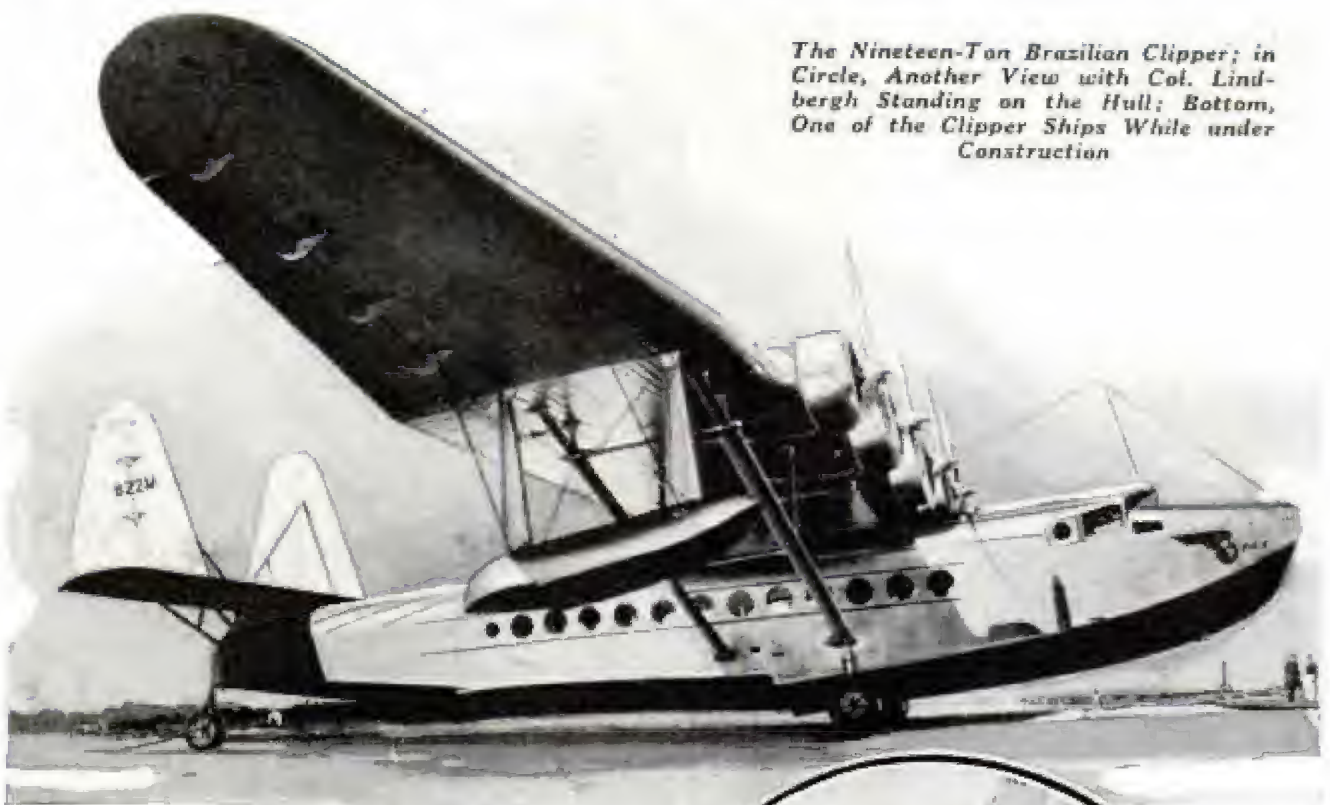
"Three years ago, the American Clipper 'S-40' went into the air express service between North and South America. She

has proved herself an outstanding success, maintaining an almost perfect on-time record of 99.8 per cent. She has successfully flown the longest over-water scheduled route in the world, between Jamaica and Barranquilla, South America.

"The Brazilian Clipper is another step in the evolution of ocean transport toward a new type of clipper that will meet every safety requirement and save days of time in flying the Atlantic ocean.

"The 'S-42,' or Brazilian Clipper, may really be considered the forerunner of trans-oceanic designs. The main characteristics of the 'S-42' are the combination





*The Nineteen-Ton Brazilian Clipper; in Circle, Another View with Col. Lindbergh Standing on the Hull; Bottom, One of the Clipper Ships While under Construction*

of long-range flying with high-lifting capacity and high cruising speed, a combination surpassing any other ship now in service. Carrying 4,500 pounds, the 'S-42' covered 2,000 kilometers at an average speed of 157.5 miles per hour. And as for altitude, she hauled 11,000 pounds up to 20,400 feet! And in still another flight she reached 15,000 feet with a load of 16,500 pounds. These feats of the 'S-42' are world records."

Concerning equipment for trans-Atlantic flying, Mr. Sikorsky said:

"While the 'S-42' is entirely suitable to start a trans-Atlantic passenger service by way of the Azores and Bermuda, yet we believe that in the future passenger traffic will justify substantially larger flying boats. Therefore, we are working on a still larger clipper, with a gross weight of fifty tons and six motors developing 6,000 horsepower together.

"By present standards, of course, such a ship is fairly huge, but I believe it is the



most economical type of craft for trans-oceanic passenger service. We will provide passengers with roomy, comfortable staterooms, dining salons, promenades,

(Continued to page 134A)



D 1225

Maximilian Skupien  
over airport at Staaken

# Parachute Jumper Talks by Radio as He Falls

How does it feel to make a parachute jump from an airplane? A German jumper decided the only way to describe his sensations was to relate them as they occurred during the descent. Accordingly he equipped himself with a microphone and radio-sending apparatus which he carried over the side when he leaped and broadcast his sensations as he fell, describing not only his feelings but what he was able to see and hear from the time he jumped until he landed. Those who watched the jump heard his voice through loud speakers.

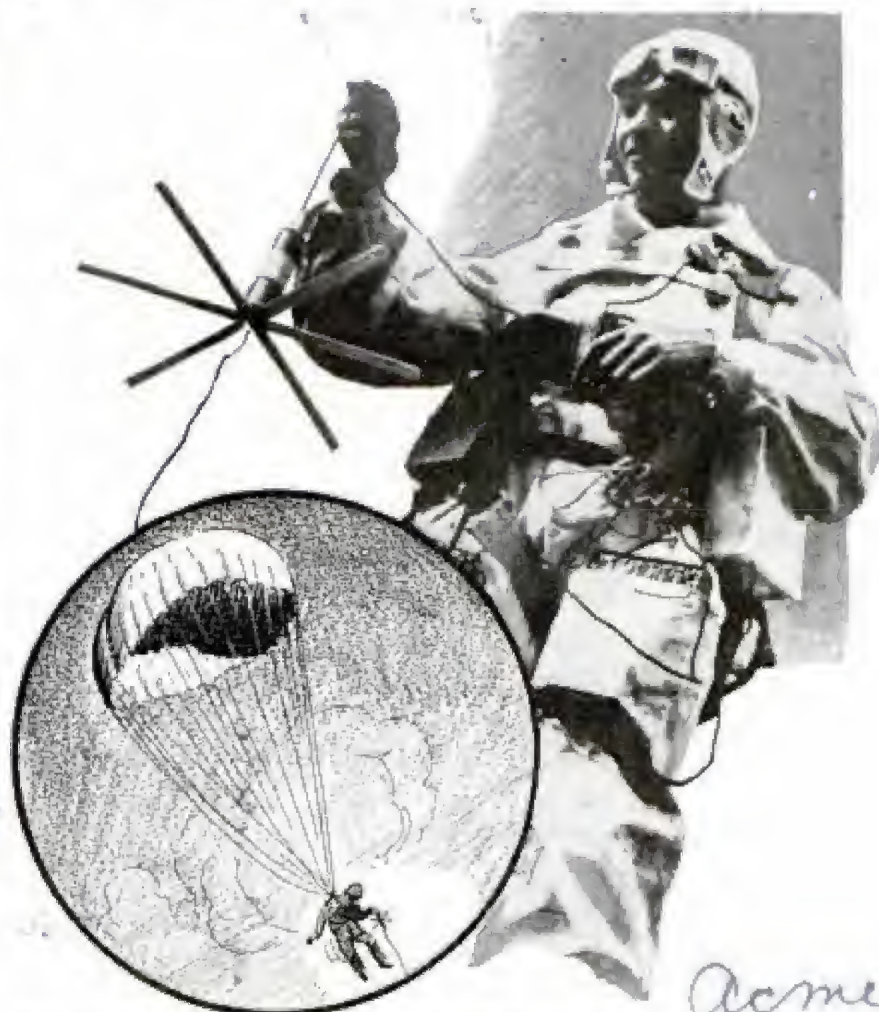
D 1226

## HIGH-SPEED CAMERA TAKES PICTURE OF BIRD IN FLIGHT

By making a photograph in one fifty-thousandth of a second, an action picture of a dove in flight was obtained recently at the Massachusetts Institute of Technology. The photograph, made just as the bird launched itself in the air, reveals in detail the posi-

Cambridge Mass

Parachute Jumper Carrying Radio-Sending Apparatus Which He Used to Convey His Sensations to Listeners as He Descended



Acme

tion of the primary and secondary feathers of the wings in a fast downward stroke as the dove sought to gain altitude. It can be seen that the feathers, except at the wing tips, overlap to prevent the passage of air through the wings. On an up-stroke, the primary and secondary feathers are rotated slightly to allow air to pass through, and thus reduce air resistance. The picture was made with the aid of a unique electrical circuit which produces an instantaneous flash of great brilliancy.

Germany is producing artificial asbestos from a synthetic hornblende.

Reported by Vice Consul C. J. Zawodski



Picture Made with High-Speed Camera Just as Dove Launched Itself in Flight; the Photo Was Taken in One Fifty-Thousandth of a Second

Photo by Prof. Harold E. Edgerton  
and Harold E. Edgerton  
Electrical Engineering  
Laboratory

Berlin, Germany  
Commence



### BRONZE PIPE WITHOUT THREAD IS SEALED AT FITTINGS



Fittings with Special Alloy Permit the Making of Joints with Threadless Pipe

Threadless fittings for bronze and copper pipe are made with a brazing alloy that provides a vibration-proof, corrosion-resisting seal when an oxyacetylene flame is applied. The alloy is incorporated as a ring in each opening of the fittings. The pipe is easily assembled by slipping the end into the fitting, heating the pipe so that the alloy melts, and then applying the flame to the fitting until the alloy seal appears as a white ring around the pipe.

### SELF-MEASURING BOTTLE CAP FOR MEDICINE CONTAINER

An accurately measured dose of medicine can be poured without the inconvenience and uncertainty occasioned in using a spoon, measuring glass or dropper if



your medicine bottle is equipped with a special self-measuring cap. The capacity of the cap depends on the amount of the dose prescribed. Within the cap is a hollow cone tapering upward and with a small opening at

its apex. To obtain a dose the bottle is shaken, the contents being forced upward into the cone, a part escaping through the apex to become trapped between the outer wall of the cone and the inner wall of the cap. When the liquid in the cap reaches the level of the hole in the cone, which can be seen through the transparent wall of the cap, the dose is complete and the cap will hold no more. The cap can then be unscrewed and the dose taken directly from it. In pouring out the dose, no additional contents of the bottle escape since a vacuum is created which prevents flow through the small hole in the cone. However, if a dose is prescribed in drops, it can be measured by holding the bottle upside down and tapping the bottom, one tap for each drop.

### OVERCOATS FOR GRAIN TANKS KEEP OUT THE MOISTURE

Concrete grain elevator tanks in the mid-west are being treated to winter overcoats to keep out moisture. First an asphaltic mixture is applied pneumatically to the outside to seal the cracks and provide an elastic weather and moisture-proof coating. Over this is placed a coat of metallic



Concrete Grain Elevator Tanks Covered with Asphalt, Then with Aluminum to Keep Out Moisture

aluminum which lowers the temperature inside the bins in hot weather, it is claimed.

A flashlight having a range of about one mile has been put on the market.

Walworth Co. Inc. 60 E 42nd St. New York City

D1258

D1295

no for info write at Kansas City Mo

Chas. J. Schaefer

84-75 Bond Electric Corp 257 Cornhill Ave



D1292

Northwestern School of Taxidermy

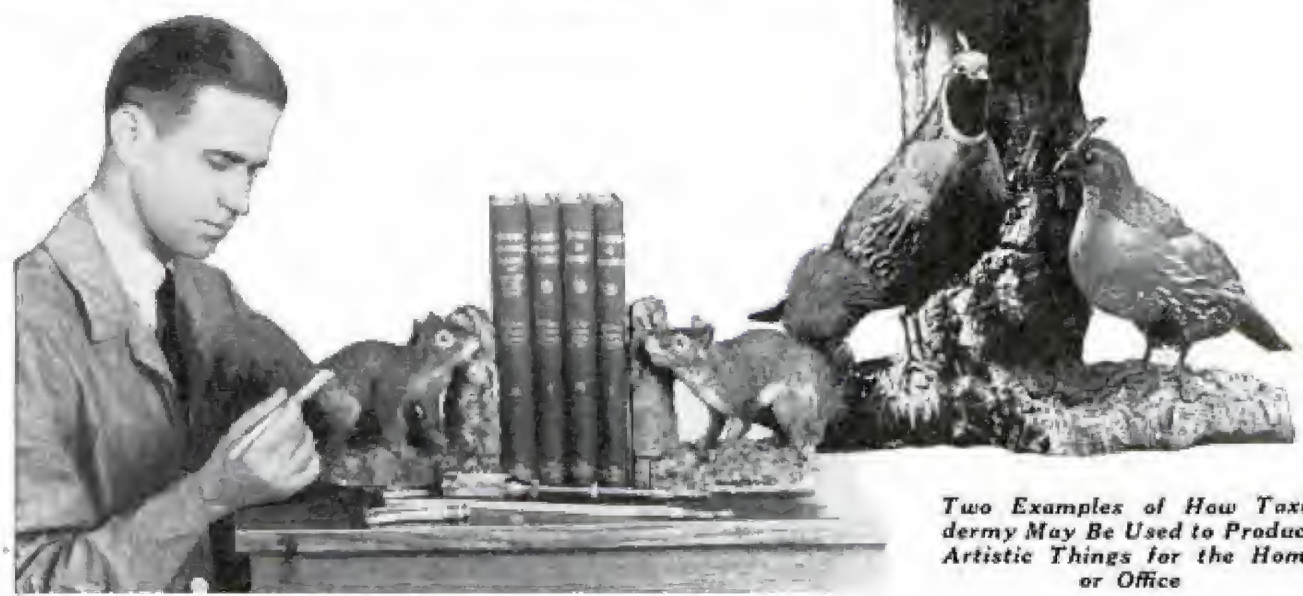
POPULAR MECHANICS

3378 Elmwood Bldg. Omaha, Neb.  
ad on back cover

49

# Beauty of Wild Life Is Preserved by New Art

Taxidermy, the art of mounting the trophies of rod and gun, is the latest addition to home craft work. It can be learned satisfactorily by those who have the desire to know it. Once learned, it becomes a source of intensive interest and can be turned into a source of additional income. Birds and beasts can be prepared so skillfully that their beauty in the natural state can be preserved permanently. The use of



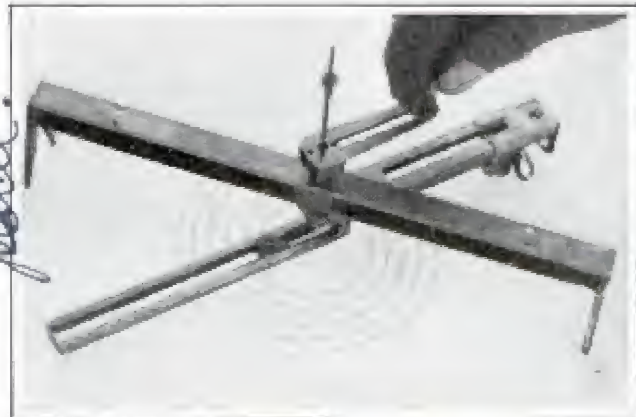
Two Examples of How Taxidermy May Be Used to Produce Artistic Things for the Home or Office

mounted birds and animals, even domestic ones, in the office and the home is growing steadily. Decorative and useful articles can be created for the home by the home craftsman who has added taxidermy to his work. The field offers opportunities for producing novel effects, such as a humorous grouping of small animals or birds.

sheet without "pin-cushioning" the surface. In using the instrument with an adapter for making spirals an attachment on the slide rod with a tube threaded inside is employed. The drawing lead is moved along a screw carrier as a cog wheel mounted on the tube is turned. Adjustments can be made to draw spirals one thirty-second of an inch to three inches between curves.

## DRAWING INSTRUMENT OFFERS MANY TOOLS IN ONE

Five tools are combined in a drawing instrument for mechanical work which performs the functions of a compass, ellipsograph, protractor, spiralgraph and scroll. The framework is an eight-inch metal bar with legs on each end. On a vertical shaft through the center is a slotted bar, enough shorter than the suspension framework to make a complete turn within the legs. Since the inscribing apparatus is all suspended, it is unnecessary to make holes in paper when drawing circles and any amount of tracing can be done on a single



This Drawing Instrument Serves as a Compass, Ellipsograph, Protractor, Spiralgraph and Scroll

101 Pongita Ave.  
not yet on market

Chas. C. J. Slycer, 818 Alamitos Ave.



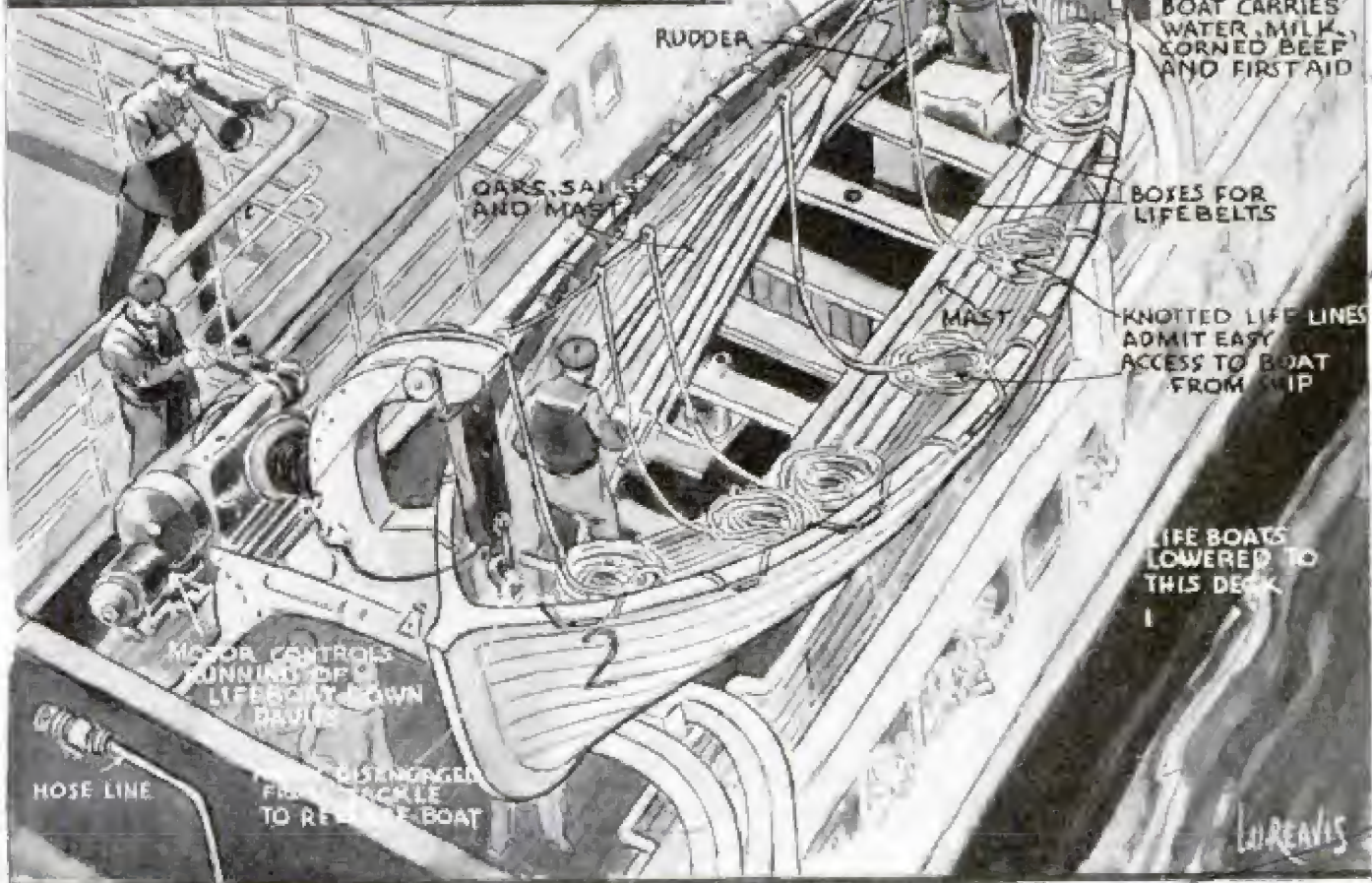
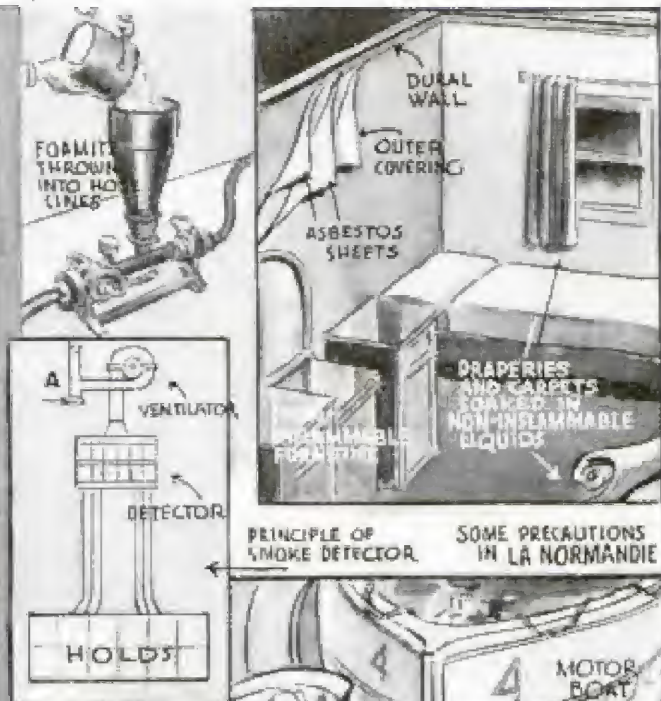
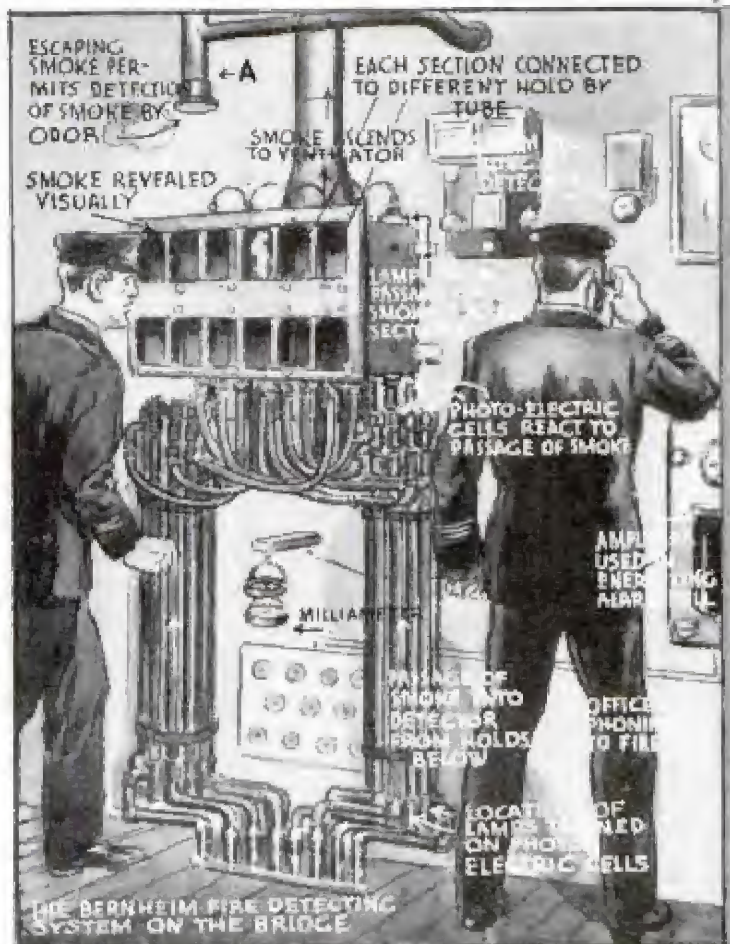
# Robot Sentinels Guard Ship from Fire Hazard



Fire—One of the Gravest Dangers Facing a Ship—Is Being Prevented and Fought Today with the Aid of Elaborate Protective Devices, Incorporated in the Cabin Liner "Champlain"



# System Detects and Smothers Blaze at Start



145 W. 45th St., New York

Detection Is the Keynote in the Protective System and Robots Stand Guard to Flash a Warning, and Enable Trained Fire Fighters to Reach a Blaze Before It Has Gained Headway





*This Billiard Table for Outdoor Play Is Made of Concrete and Covered with Rubber; Note the Rake Used with Cue in Making Shots*

### BILLIARD TABLE OF CONCRETE FOR OUTDOOR PLAY

For the billiard enthusiast who likes to play at home but has no room for a table in the house, an Ohio man has developed an outdoor billiard table. Built on a concrete base, it has rubber cushions and resembles a regulation pocket billiard table except that it rests directly on the ground. Balls a trifle larger than billiard balls are used and a heavy cue is employed with a rake for all shots, the rake operating on a swivel. The most popular game for this table is a cross between pool and billiards. A ball into a pocket counts one, a billiard three and a three-ball billiard six. Balls going into pockets on one of these shots are added to the score.

### ZIPPER ACTION FOR LAMP CORD UNSHEATHS CONDUCTORS



Lamp-cord insulation with zipper action for opening permits easy, quick and safe unsheathing and separation of the conductors. The rubber-jacketed conductors are parallel and when pulled apart

the jacket divides easily and evenly, leaving a complete rubber insulation on each conductor. The cord can be stripped down without impairing the properties of the individual conductors and is said to be long wearing, flexible, and fray-proof.

### GREASE CARTRIDGE FOR AUTO GUN

Grease packed in cartridges and a new type "gun" to "shoot" the lubricating materials to all parts of the automobile have been introduced. To fill the grease gun, the operator merely slips in a factory-loaded cartridge of the lubricant desired. After using the required amount, he removes the cartridge and substitutes another. Each cartridge can be used again, and repeatedly, until empty. In this way, a single gun serves for a full greasing operation involving the use of several different lubricants. Units consisting of the gun



*Top, Inserting Grease Cartridge; Bottom, Cutaway Showing Parts of Grease Gun*

and six cartridges of different lubricants are being marketed by the Standard Oil company of Indiana. The cartridges are the non-refillable type. The new greasing system makes possible more efficient home lubrication of the automobile.

*U.S. Rubber Co. 910 S. Michigan Ave. Chicago*



# Plumber-Artist Achieves Fame with Hobby



Top, Left, Chiseling Recess for Inlay; Right, Press Makes Strong Bond; Bottom, the Finished Work



Developed as a hobby in the rear of his plumbing shop, an original method of making pictures and mosaics of hardwood inlays is bringing widespread fame to F. F. Burfitt of Portland, Ore. His latest portrait, that of President Roosevelt, has been obtained by the postmaster general to be hung in the post-office building in Washington. At exhibitions of his work, one at A Century of Progress, Chicago, and another in Paris, France, his skill and originality in producing unusual effects with wood and glue have been acclaimed. The method differs from ordinary inlays in that it is perma-

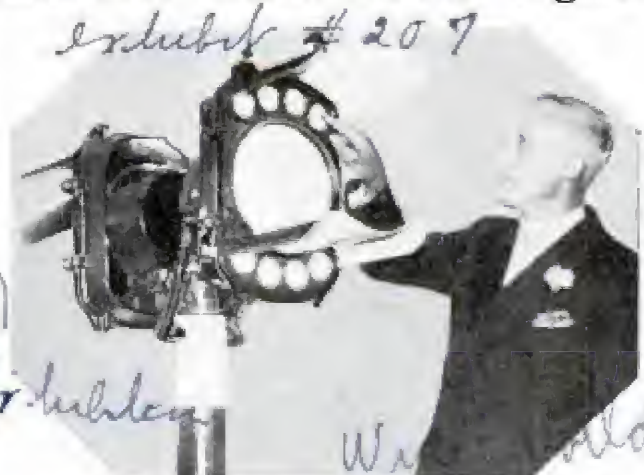
nent and almost perfect from a mechanical standpoint. Instead of thin veneers, the pieces of wood used to produce his figures, in various colors, are one-quarter of an inch thick. Each piece is inserted in a recess chiseled out in the base board and glued

in under pressure of a hand press. A waterproof glue, which is not affected even by boiling water, makes the bond permanent. The artist has produced mosaics containing as many as 10,000 pieces. In the Roosevelt portrait, some of the pieces were only  $\frac{1}{1000}$  of an inch thick. The work starts with a pencil sketch from which the artist works to dimensions, measuring each feature and transferring it to the board.

## One-Lamp Stop-and-Go Signal Has Small Timer Lights

Greater simplicity of design is found in the latest traffic signal lights recently demonstrated in London. There is only one large signal face for red, green and amber. The light also has pilot duration lamps to indicate the unexpired period of the main signal, showing the motorist whether he has time to reach and cross the intersection before the light changes. The duration lights are much smaller than the main signal.

(An electric-eye counter on a toll bridge not only counts all cars crossing but also records the direction of travel.



Latest Traffic Signal, with One Large Lamp and Several Small Time-Interval Lights

General Electric Review

Salisbury, N. H.

7134 N. E. Sandy Blvd.



The story of man's progress  
 from the beginning of time  
 to the present day.

Published by Collier Co  
 919 N. Michigan, Chicago

# THE STORY OF HOME BUILDING



In Earliest Times Our Ancestors, as They Roamed in Search of Food, Acquired the Habit of Seeking Shelter in Natural Caves

When the Ice Descended from the Arctic, Driving People Southward Where There Were No Caves, Primitive Man Built Crude Mud Huts



As Man Progressed, He Acquired Cattle and Roamed About Seeking Pasture; Then He Built a Cave of Skins



As He Found How to Make Better Tools, Primitive Man Began to Cut Blocks of Stone and to Make Bricks of Clay to Build a More Permanent Form of Shelter



When He Learned How to Fashion Crude Bronze Tools He Began Cutting Down Trees and Building Log Caves

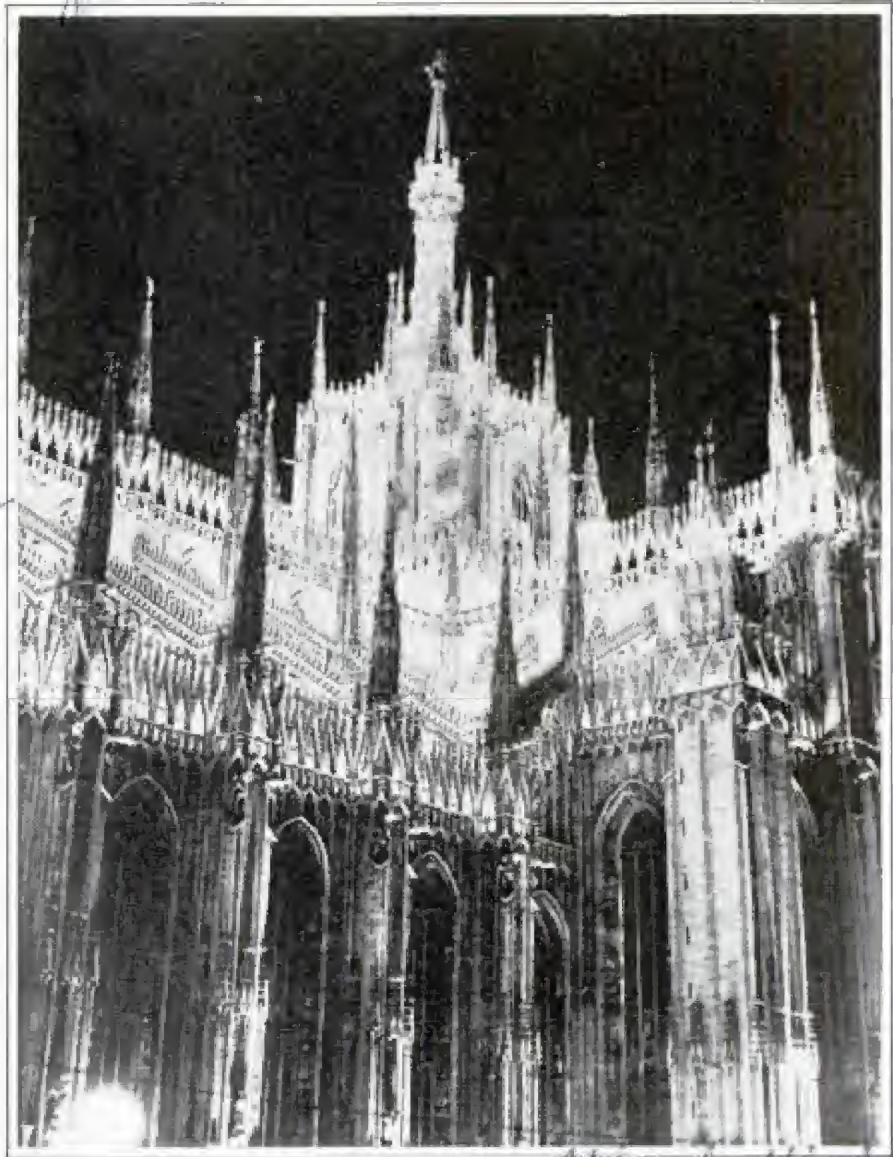


Man's Earlier Habitations Were Heated by a Fire on the Floor; from a Hole Cut in the Roof the Chimney Gradually Evolved



# Lights Emphasize Beauty of Milan Cathedral

*Italy*  
 Milan cathedral, one of the architectural wonders of the world, is rendered even more beautiful when its spires are accentuated by night illumination. The cathedral was lighted in honor of a recent visit of Premier Mussolini and the lights emphasized the lacy filigree work adorning the outside of the structure, as shown by the night photograph.



*Beautiful Milan Cathedral as It Appeared When Illuminated at Night; Note How the Lights Emphasize the Graceful Outlines*

## REFUSE COLLECTED IN ROTATING TANK ON TRUCK BODY

*D1348*  
 Garbage disposal is simplified by a refuse collector consisting of a large steel tank mounted on a truck body. The tank is set on a cradle in such a way that it is pitched forward at an angle, and the receptacle can be rotated in either direction. The machine is filled from the rear and doors can be opened in three ways to permit various sizes of materials to be loaded. In operation the tank turns at an idling speed of from six to twelve revolutions per minute. This motion, due



*Refuse Collection Truck Equipped with Rotating Tank Which Aids in Loading and Dumping*

to the angle at which the tank rests and to low steel vanes inside the tank, pushes material forward automatically. In dumping, a hydraulic hoist elevates the tank to the proper angle after which a tail gate is automatically opened and the body is rotated in reverse direction to break up the load and force it out. One man can operate the entire unit from the driver's seat and the tank does not permit odors, dust or liquids to escape. The collector has also been found well adapted to snow removal.

Names and addresses of manufacturers and dealers in articles described, and any other details in our possession, will be furnished by our Bureau of Information upon request, accompanied by postage.

*American La France and Engine Bldg Broadway*



# TELLING *the* WORLD



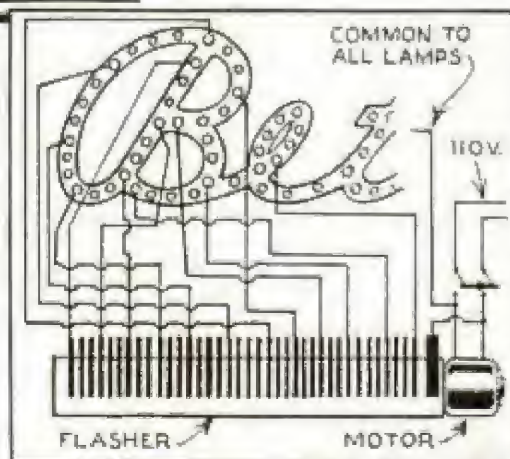
Behind the glamour of this extravaganza of illumination lies the hard fact that the cost of maintaining the nightly "show" runs into millions of dollars annually, a huge expenditure whose beneficiaries are the artists and construction men who design, build and install the signs, the real estate men who collect high rentals for sign space on the street, the company providing the electric current, and many others.

The job of keeping in nightly scintillation the bright spots of the world's principal thoroughfares involves the close cooperation of more than thirty differ-

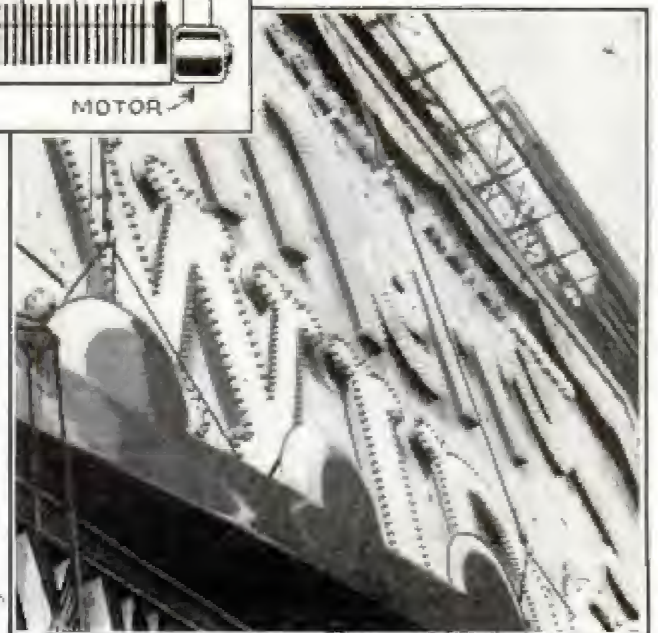
**S**PEAKING a language all can understand, the intermittent flash of bulbs and tubing packs a story in a word—and the word sticks. The punch it deals to the public consciousness is as great as its illuminating power plus a cleverly executed idea.

Following this principle the vast industry which deals in electric signs has converted the world's centers from darkness to brilliance, added to the gayety of nations, turned night into day and given employment to thousands of persons skilled in the varied crafts of sign building, in its electrical phase one of the most astonishing products of the twentieth century.

What else but its electric signs is responsible for Broadway's fame throughout the universe as the "Great White Way," whose nightly brilliance has won it a reputation as "the brightest spot on earth?"



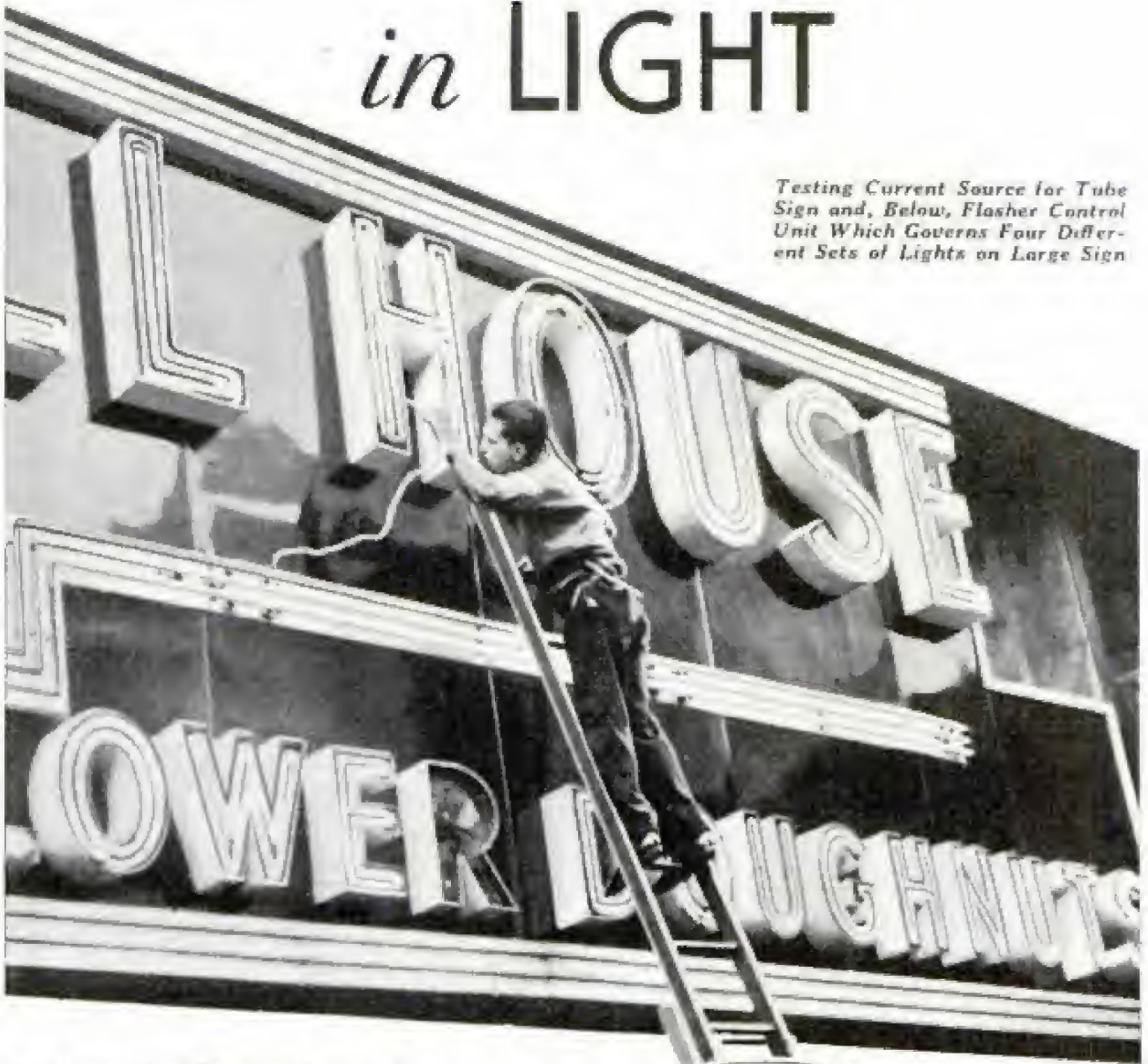
*Above, Blowing into Tubing after Heating to Keep Passage Clear; Left, Diagram of Circuit for Script-Writing Flasher; Below, Sign Building Involves Many Crafts*





# in LIGHT

*Testing Current Source for Tube Sign and, Below, Flasher Control Unit Which Governs Four Different Sets of Lights on Large Sign*



ent types of skilled artisans, sign writers, scenic artists, electricians, mechanical engineers, metal plate workers, and blacksmiths, in addition to every type of worker employed in the building trade.

Getting down to specific figures, the electric signs in Times Square, the heart of Broadway, burn a total of 500,000 watts per hour from sundown until 1:00 a.m. The larger signs, referred to in the trade as "electric spectacles," range in cost from \$40,000 to \$100,000 a year complete from designing to servicing. Smaller signs run as low as \$5,000 a year.

The most prominent spot on Broadway and, indeed, as A. D. Donnaud, of the General Outdoor Advertising company, which builds and services practically all of the big signs in Times



Square, says, "the world's greatest spectacular space at the world's greatest point of circulation," is occupied by Squibb's



Quality neon sign  
Cor 230-7th Ave  
New York



yellow sun rising from a sea of blue. Someone has estimated that it costs the advertiser \$275 a night to tell the world in light.

This sign, with its 10,000 white and colored bulbs, burns 196 kilowatts an hour, or enough to light 30,000 average homes. Fifty-five feet high and twenty-nine feet wide, its individual letters ranging in height from four feet to nine feet, it is equipped with a special electric switch with an astronomic dial which automatically turns on the lights at sundown. Construction of the sign included 94,500 feet of wire and five tons of iron and sheet metal.

One peculiarity of the sign-building business is that the builder's work does not cease with the delivery of the sign. Two men walk about Times Square all night watching the lights to make sure all the bulbs are working and jot down those which have gone dead. They record an average of 1,000 bulb "fatalities" nightly, the causes being wind, rain and sudden changes in temperature. A crew of four men pick up these reports in the morning and replace the useless bulbs, lowering themselves in bosun's chairs from the tops of the signs.

The electric bulb in many quarters is giving way to the "canned lightning" of gaseous tubes. Remarkably attractive "paintings in light" have been produced through the use of the variety of colors available to the designer of tubing signs, including red, blue, green, gold and variations of these hues.



The invention of Georges Claude, French scientist, the tube process is based on the action which takes place when electrical current passes through certain gases. Originally known as "neon" lighting because this was the gas used producing red light, the method is still popularly and erroneously referred to under this name although a variety of gases producing a variety of colors have since been introduced, including argon, krypton, xenon and helium, as well as mercury.

Neon gas used alone will give red, a slight amount of neon mixed with a large amount of argon gas will give a blue-green color. Argon gas alone in clear glass



Above, Transferring Diagram to Asbestos Pattern and, Below, Glass Bender Shaping Tubing to Conform with Pattern

tubing gives blue, while the same gas if flowing through a canary-colored tubing produces green, mercury being used as a catalyzing agent. Helium gas used alone gives a white glow in clear glass tubing, while the same gas when passed through canary tubing produces a gold light. By means of splicing clear glass tubing onto canary tubing, it is possible to have a combination of colors by using a single gas; thus, argon flowing through clear and then through canary tubing will show blue in the clear section and green in the









Blowing Rice-Hull Ashes into the Attic of a Building to Form Layer of Fireproof Insulation

### RICE-HULL ASH INSULATION BLOWN INTO BUILDING

Rice-hull ashes are blown into the attics of homes and office buildings to serve as insulation by a recent process which makes it possible to put a four-inch layer of this fireproof material in place quickly. A thin layer of the ash powder is laid first, then the fluffy portion of the ash, and over this another layer of powder is spread. This keeps the ash from packing and enables it to retain its millions of air cells necessary for insulation purposes. The ash does not pass through the blades of the blower but enters the discharge pipe through a hopper. A flexible pipe in the attic assures an even distribution.

### SIGHT IS RESTORED TO BLIND BY GRAFTING CORNEA

By grafting new corneas on both eyes, sight has been restored to Miss Daphne Muir, English novelist, who became blind when both corneas were injured in an ac-

cident several years ago. The cornea is not the eye lens, but a transparent tissue in front of the lens. Numerous cases have been reported of a successful graft of a cornea onto one eye, but there are said to be no other cases of a double cornea transplant. The grafted corneas were taken from eyes which had to be removed from patients suffering from other conditions, and instead of being stitched to underlying tissues, they were held in place by strands of surgical silk applied something like a cross-stitch in embroidery, pressure holding the new tissues in place until they grew fast. Miss Muir's vision is not perfect, but she can see to go about the streets and can read newspaper headlines and her own correspondence.

### SERPENTINE COILS OF METAL VULCANIZE INNER TUBES

Mass production of automobile inner tubes is made possible with the aid of huge metal coils which resemble a giant serpent when viewed as a unit. The snake-like coils are called mandrilles and are used for vulcanizing the rubber tubes.



These Snake-like Coils Are Called Mandrilles and Are Used to Vulcanize Automobile Inner Tubes

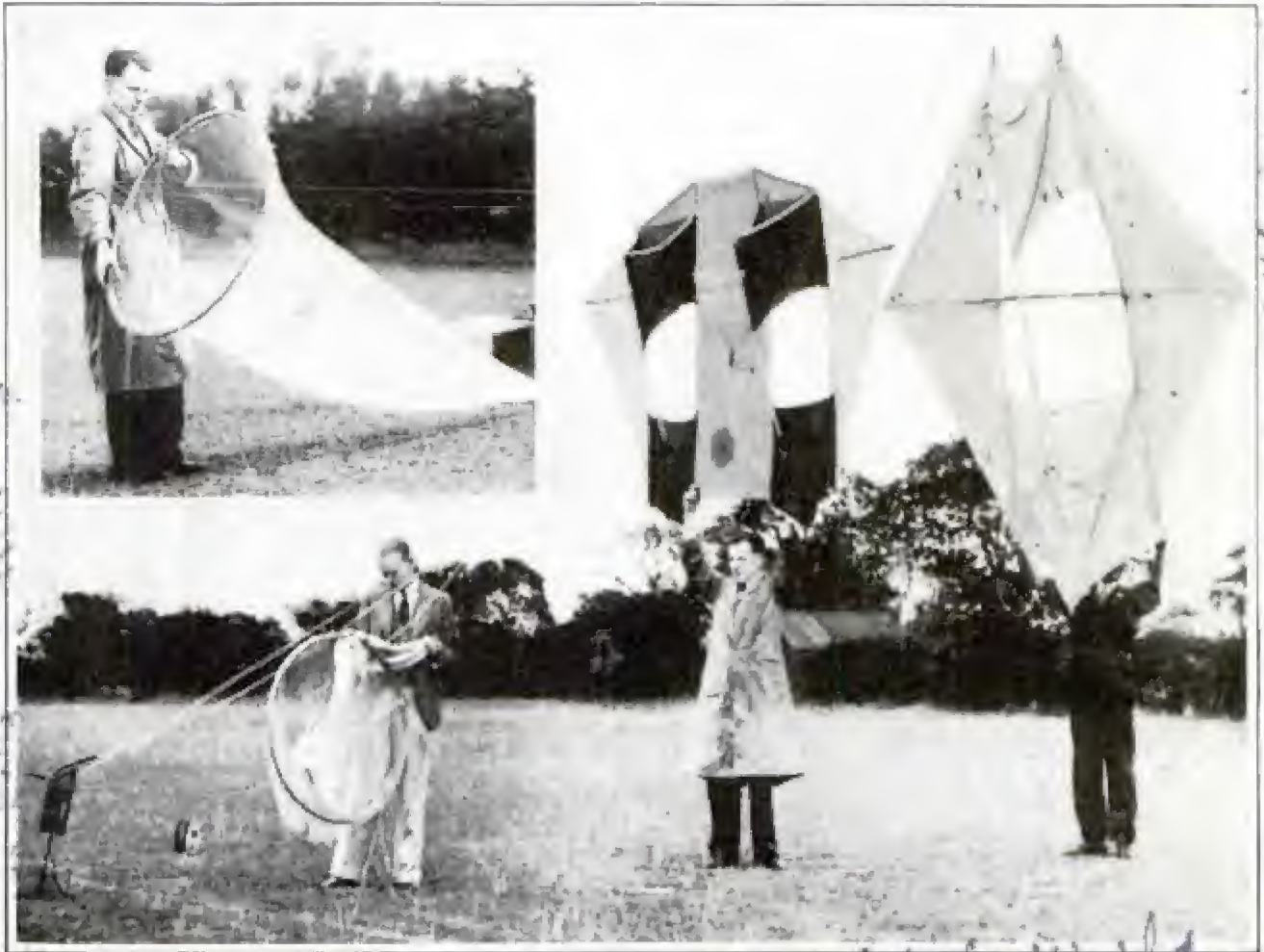
There are over 17,000,000 radio-equipped homes in the United States, but only about 11,000,000 with telephones.

Science Service 10/16/34

Coe - Chronicle July 6



# Insects Captured in Nets Attached to Kites



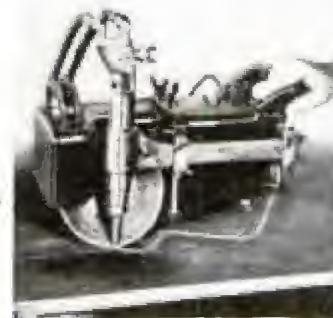
These Nets, Attached to the Big Kites, Are Sent Aloft to Collect Insect Specimens; by Means of Chemical Fuses, the Nets Can Be Opened and Closed from the Ground

Big nets attached to huge kites are being used in England in an effort to determine the species of insects being carried into that country by the winds from the continent. The nets and kites also determine at what heights the insects are found. By means of chemical fuses it is possible to open and close the nets at will from the ground.

## MOTOR TORCH SHAPES STEEL TWO INCHES THICK

Adjustable to travel at various speeds, a new motor-propelled cutting machine is available for cutting steel plates and slabs into shapes having straight, circular or irregular outlines. The motorized torch, which uses acetylene gas, is guided by hand along the contour laid out and scribed directly on the plate or slab. It is possible to turn sharp corners and to fol-

low intricate contours with the machine. With a radius rod in place, it will automatically cut arcs or complete circles. The torch can travel up an incline of ten degrees on steel plate without slipping. Once



the operator has set the travel speed, lit the torch and pressed the starting switch, he can confine his attention to guiding the machine. It is only sixteen inches long, uses

110-volt alternating or direct current and weighs only forty-eight pounds.

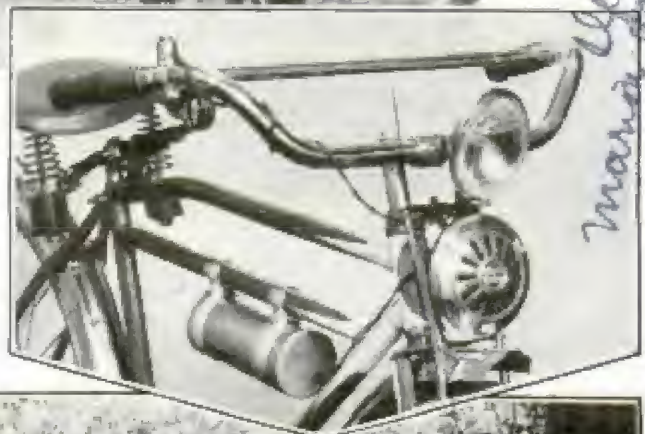
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*W. J. Reduction Sales Co.*  
*1110 Broadway, New York, N.Y.*



D1270 Mr. Jacob Blecher  
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 New York City

# The AMAZING



**T**AKING its cues from the automobile and the airplane, the bicycle of today has staged an amazing come-back in the past two years. With 3,000,000 cyclists already riding the highways and byways, the springing up of bicycle clubs all over the country and the revival of the famous American Wheelmen of America, the national cycling organization, plans are being made for the building of bicycle paths alongside the highways.

Sales of bicycles totaled 408,697 in 1933 as against 249,500 in 1932, an increase of sixty-three per cent, and the figures for 1934 show a continuing rise in sales.

Cycling as a sport and as a means of getting about is now being used at schools and colleges, at vacation resorts, in city parks, in the smaller towns and the less populated parts of cities. The renting of bicycles for a ride of an hour or so in a park or along a quiet street has become an important phase of the revived in-

Above, Playing Bicycle Basketball; Center, Combination Horn and Light, One of the Latest Accessories; Below, Taking Brake Temperature during Test



D1270

# RETURN of the "BIKES"



terest in cycling and many have found this a way of making some extra money or of creating an established business earning a man-size living. A student at the University of Michigan, finding himself low in cash, managed to get together enough to buy twenty new bicycles and with this equipment started a renting business which brought him a fair income.

Boys obliged to add to the family income have found the bicycle a good way to do it. Starting up a "business" of light delivery service, boys have made money delivering monthly bills for public utility companies, collecting for installment houses and real estate owners, taking orders for groceries and then delivering the goods, delivering lodge, party and club notes, delivering special delivery letters for the post office, delivering for cleaning and pressing establishments, for florists and for ice-cream dealers. One city library has built up a telephone trade through the use of boy

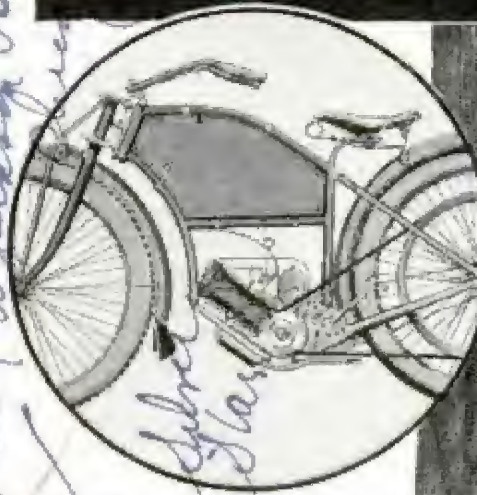
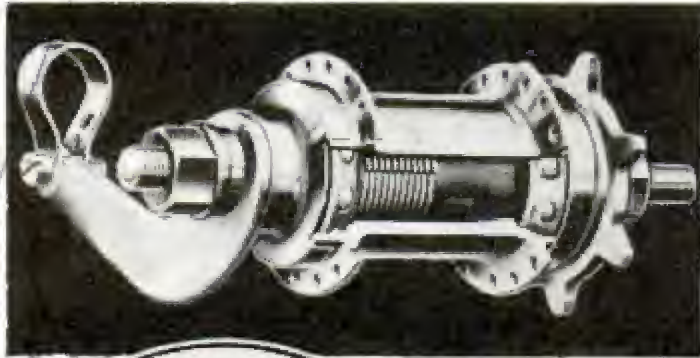


A Pioneer Cyclist and a Cycle Parking Lot on Bicycle Day at the 1934 World's Fair Indicating the Popularity of Bicycles Today

Col. Albert A. Pope. 63



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1290  
64



Above, Brake Which Will Stand Pressure of 2,350 Pounds per Square Inch, and Eighty-Pound Motor Bikes Capable of Fifty Miles an Hour; Right, Pedal Lights to Warn Motorists, and Bicycle with Two-Speed Drive

cyclists who collect books on the day they are due and deliver new books where wanted. Bicycles made in American factories today stress streamlining, lightness and speed, and make use of chrome-plating to improve the appearance of the vehicles. A bicycle which emphasizes its lightness weighs slightly over thirty pounds and is equipped with a hand brake operated from the handle bars. A streamlined bicycle is equipped with rubber mountings to decrease rattles. Particular importance is seen in the placing of these rubber mountings at the front and rear axles.

Inventors are constantly at work developing new conveniences for the bicycle rider. To illustrate the thoroughness with which experiments are carried on preliminary to manufacture, consider the methods used by a prominent maker of coaster brakes for bicycles.

For weeks husky testers maintained a camp in the vicinity of a New England mountain. Day after day they coasted down the precipitous mountain roads. Many types of brakes were subjected to

the most grueling punishment. At the end of each ride engineers examined the metal, they took its temperature, disassembled it and examined minutely the effects of the terrible strain.

Then, with their data assembled and with the knowledge gained from the design and manufacture of heavy-duty ball bearings for automobiles and machinery, a brake was designed and built which included twenty-two brake disks and twenty-one braking surfaces, and a leverage was set up which makes it possible for a 200-pound man to exert 2,350 pounds of pressure



per square inch on the 12.20 square inches of available, usable braking surface. The principal parts of the brake are made of the toughest steels—nickel with relatively high chrome content.

A two-speed drive device being offered by one company prevents laborious walking up hill or trudging through mud or snow. The rider, operating a conveniently located lever, which shifts the gears easily, goes into low speed as soon as a hill is encountered or the going becomes difficult and resumes high speed when smooth roads are reached. The low speed is two-

(Continued to page 130A)



## Home Furnishings Made of Braided Wire

Flat braided wire, originally developed for reinforcing the edge of automobile tires, has been found adaptable to the making of a large variety of home furnishings and other articles. It is not only strong and flexible, but can be made in many patterns and designs and hence has been found ideal in combining decoration with durability. It is manufactured of various metals and has been found suited to such a variety of uses as automobile tire covers, lamp bases and shades, floral baskets, urns and vases, beverage sets, casserole and fruit-bowl holders, novelty jewelry, waste baskets, magazine holders, candle sticks and screens. It is also used in reinforcing furniture, and chairs and buffet tables have been made of it while it lends itself readily as a reinforcing material and protective covering for rubber hose.



*This Tire Cover and the Flower Basket, the Table and the Lamp and Shade All Are Made of Flat Braided Wire*

## Grooved Brick with Tie Rod Makes Buildings Stronger



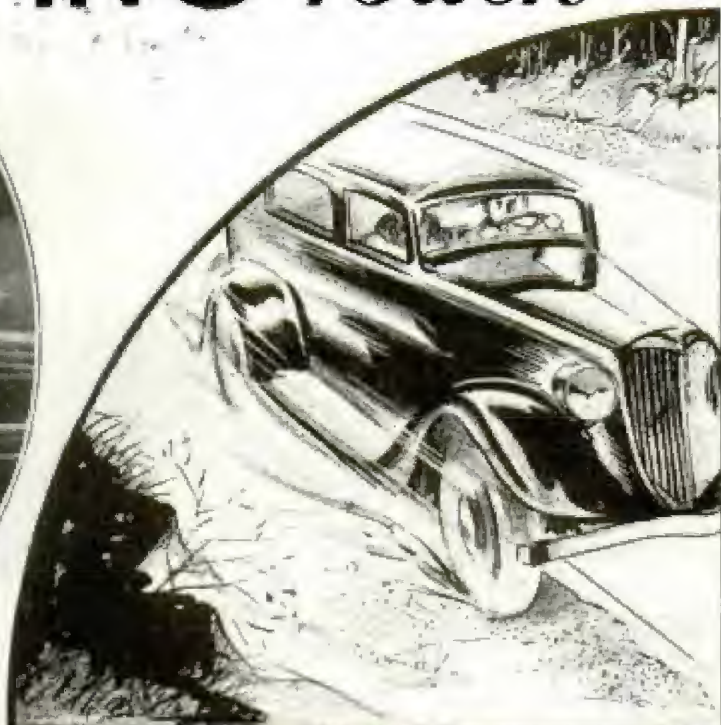
*Rods Tie Bricks Together in Wall*

Increased safety may be built into the home, factory or office building by using a new grooved brick into which is imbedded a steel tie rod. A layer of horizontal rods at every fourth course of height is tied together with steel clamps connected to the vertical rods, thus tying the entire wall into a solid mass. The vertical tie rods can be made in any length desired, so that the brick mason is unhampered in laying the brick. Special attention is given construction at corners of the wall to give even greater safety. Buildings with walls of this type are said to be practically storm and earthquake proof. The walls can be of any thickness desired.

*D 1245*  
*Andrew G. Steyer S.O. S. Buck*



# Is Your DRIVING "Touch"



YOU may have to learn to drive all over again to get the best out of your new car. Improvements have made many habits and pet ideas of veteran drivers obsolete.

Many owners who condemned free wheeling were simply covering up their own inability to operate the free-wheel control skillfully. Others do not shift into second gear on steep down grades because they cannot make up their minds to go straight through to second from high.

"Double clutching" has no place in modern transmissions, except in those cars where the gears actually are not of synchronized design. The purpose of this process is to bring the gears into suitable speeds for meshing. To shift into second when going down hill the old-fashioned driver declutches and shifts to neutral. Then he engages the clutch and races the motor to bring up the speed of the gear on the transmission countershaft with which the second-speed gear of the main transmission shaft will mesh. Finally he completes the shift by declutching and pushing the shift lever through to the second-speed position. All this is unnecessary—often disturbing—to a synchro-mesh transmission.

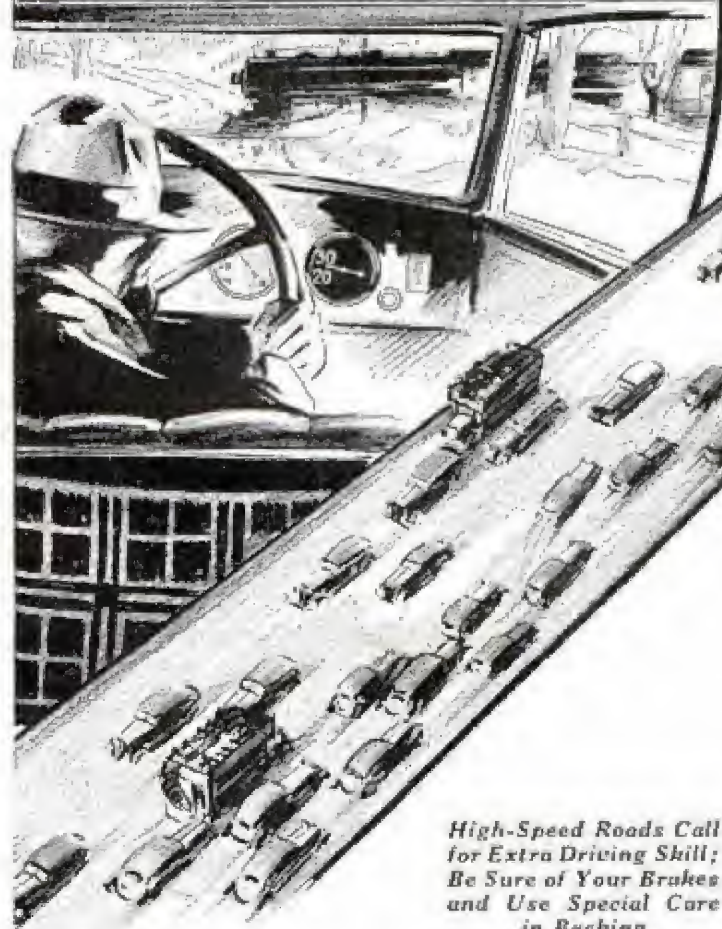
The importance of "touch" in bringing out the best in the new cars is best illus-

*Always Be Prepared for a Blowout by Gripping the Wheel Firmly with a Thumb around a Spoke to Prevent Wheel from Slipping; Never Try to Pull Out of Soft Shoulders Suddenly—Allow the Car to Lose Speed First; Don't "Out-Drive" Your Headlights—Be Sure You Can Stop in the Distance You Can See Ahead*

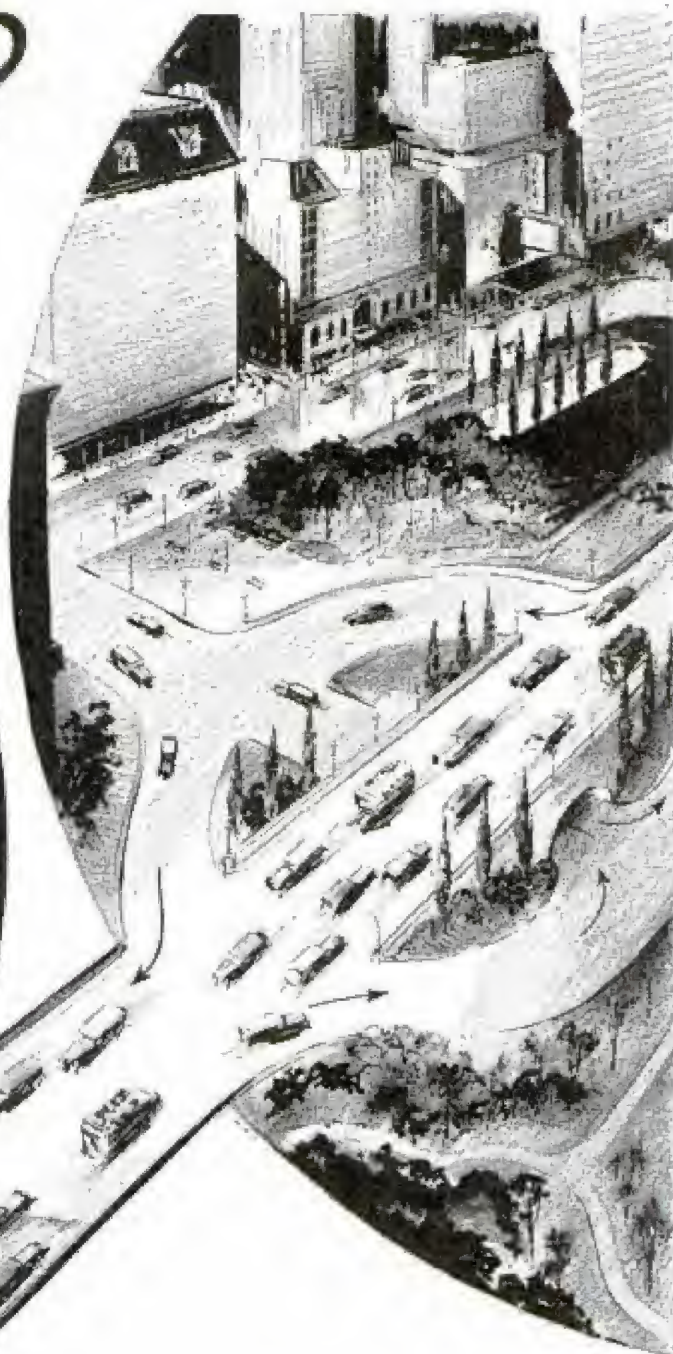




# MODERN?



*High-Speed Roads Call for Extra Driving Skill; Be Sure of Your Brakes and Use Special Care in Backing*



creasing the possibility of a skid but making it more difficult for the driver behind to avoid a rear-end collision. Any driver who is accustomed to "jumping" on the brakes in order to bring his old car to a stop must turn over a new leaf the moment he takes the wheel of a new model.

Special care must be exercised in using the modern hand brake, especially where this is simply another way of operating the four sets of service brake shoes. If the hand brake is on the propeller shaft it never should be used while the car is in motion. If it operates through the service brakes it should be used sparingly, even for parking. One of the new rules with this latter type of hand brake is to avoid

trated in braking. To stop any car equipped with a vacuum assister, the driver has but to press his foot lightly against the brake pedal. If he bears down on the pedal, the car will stop too abruptly, not only in-





*Above, Testing a Streamlined Model; Right, Gear Shifting Is Smoother if Clutch Pedal Is Not Pushed Too Far*

using the service brakes too freely before parking. Service men say most of the trouble with today's brakes is caused by warped drums, ninety per cent of the warpage resulting from setting the brakes for parking when the drums are hot.

A hand brake that forces the brake shoes to bear against hot drums produces a distortion that makes it impossible to obtain equalization. This, in turn, results in uneven wear on the drums and shoes. Eventually the owner is forced to have the drums trued by scraping off the high spots. That thins the stock and makes the drums that much easier to warp again, because invariably the owner fails to realize that his old-fashioned driving was at the seat of the trouble. Try not to use the brakes more than absolutely necessary.

Because all the new cars travel so much faster, the matter of touch in braking is all the more important. High compression

means that as soon as the accelerator is allowed to come up to the idling throttle position the engine itself will furnish an immediate and noticeable check on speed. This braking force should be allowed to take effect before the braking system is brought into action,



*Above, Give Your Thermostatically Controlled Shock Absorbers Time to Adjust Themselves to New Kind of Road; Left, the Internal Expanding Brake Does Not Burn and Seize When Over-Used on Long Grade; It Simply "Fades" and Fails to Stop Car Efficiently*

otherwise there may be too much deceleration for the good of the car's stability.

Straight-line steering is essential when the brakes are applied, but the old-fashioned driver is likely to think he must tug at the wheel to keep the car on a straight

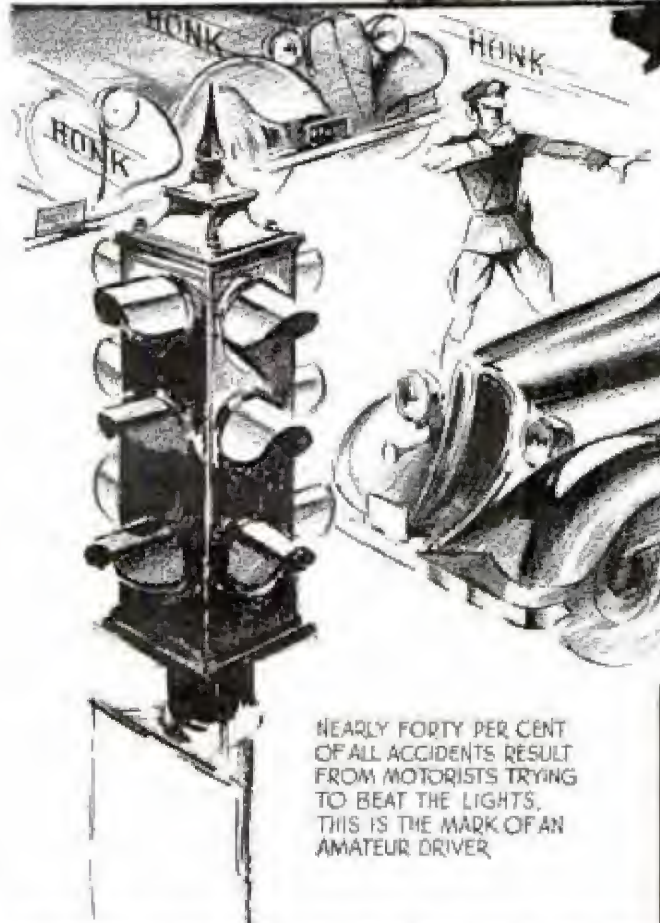
(Continued to page 120A)



# FALLACIES *of* DRIVING



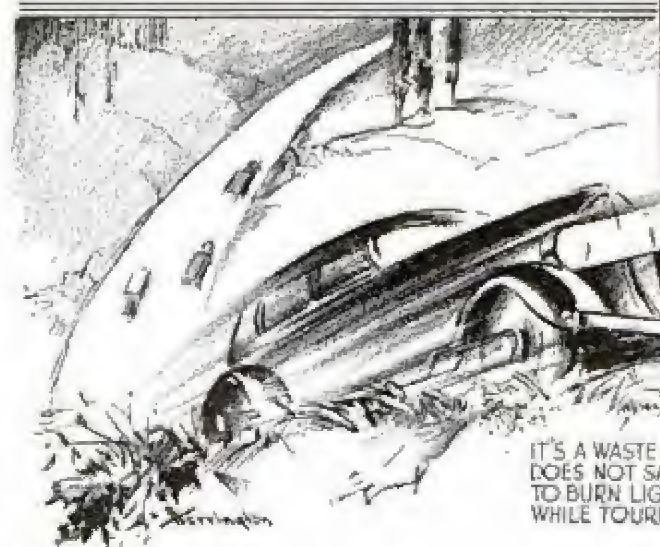
DON'T USE BRAKES ON A CURVE. BRAKE BEFORE YOU REACH IT AND THEN STEP ON THE ACCELERATOR



NEARLY FORTY PER CENT OF ALL ACCIDENTS RESULT FROM MOTORISTS TRYING TO BEAT THE LIGHTS. THIS IS THE MARK OF AN AMATEUR DRIVER



DON'T DOUBLE CLUTCH ON A HILL. PULL THE LEVER BACK FAST



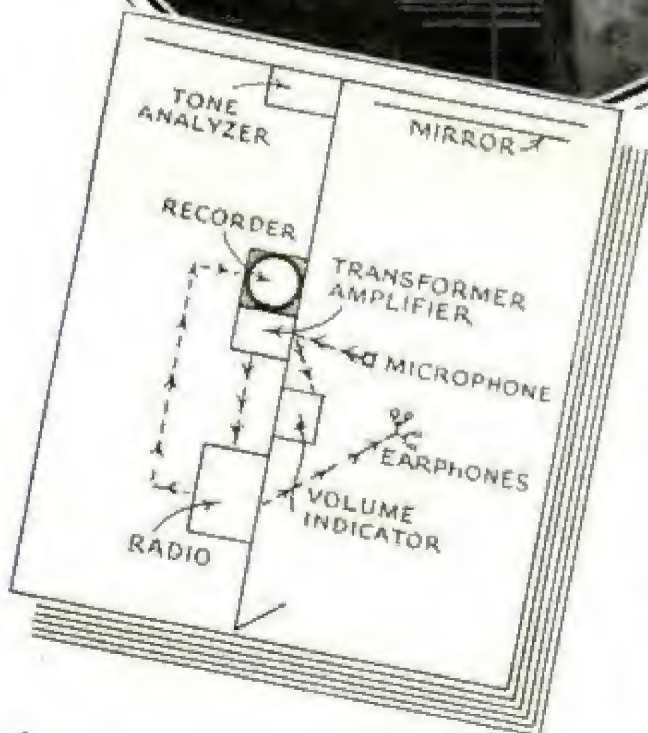
IT'S A WASTE OF BULBS AND DOES NOT SAVE THE BATTERY TO BURN LIGHTS IN THE DAY WHILE TOURING



## How Singers for Radio Are Made in Studio



Teacher and Student at Microphone Listening In on Headphones, and Volume Indicator Showing Power of Voice; Left, Plan of Training Studio



Singing over the radio is unlike any other singing and many artists have been forced to change their technique entirely when they appear before the microphone. The best voice for broadcasting purposes is one that is soft and yet clear, for volume can be produced in the amplifier, but reduction of volume cannot always be obtained satisfactorily. One voice teacher who trains radio singers has developed a complex set of mechanical devices to aid

the artists. One set-up is so arranged that it duplicates broadcasting conditions and, in addition, brings the singer's voice back to him through headphones so he can hear exactly how it is coming from the loud speaker. In the studio the student sings into a microphone and observes the needle of a volume indicator. His problem is to develop smoothness and evenness, and when the needle remains fairly steady, he knows he is doing this. A mirror in the studio also enables him to watch his posture. The microphone carries the voice to a transformer-amplifier in another room. Here also is a radio receiver which, in addition to its loud speaker, is equipped with earphones. Leads carry the earphones back to the studio so both instructor and pupil can listen in. There is also a phonograph recorder on which a record of the student's performance can be taken. This record together with a corrected version made by the instructor is taken away by the student to use as a guide in practice. The recorder can also pick up a voice com-

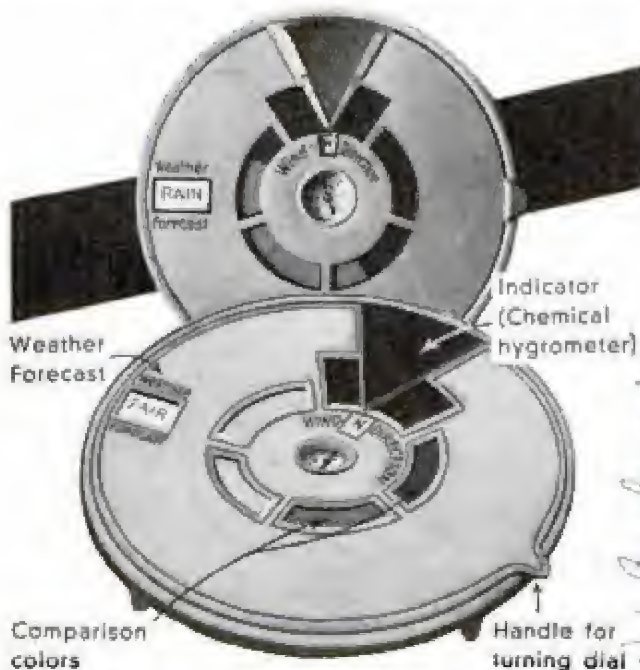
Conh John A. May, Box 292, Hollywood, Calif



ing over the loud speaker and sometimes students living at a distance and doing radio work ask that a recording be made of their singing by the instructor who sends them the records together with another set containing the corrections. Radio tubes which control a revolving dial enable the student to maintain correct pitch. The student watches the dial. When his tone drops in pitch, the dial moves in one direction, when it rises, it moves in the opposite direction and when he is on pitch it remains stationary. A tremolo causes it to vibrate.

### WEATHER FORECASTER SHOWS CHANGES ON DIAL

Coming changes in the weather are shown by a mechanical forecaster. On the dial of the instrument are chemical strips indicating the degree of moisture in the air by their color. The user notes the prevailing color and turns the dial until the indicator points to a similar color on the dial card. The dial is then moved until the direction of the wind appears in an upper opening and a built-in barometer is con-



Dial of Weather Forecaster Which, When Properly Adjusted, Indicates Changes in Advance

sulted to determine if the pressure is rising or falling. A compass in the center of the dial aids in finding wind direction. When all adjustments have been made on the dial, the weather forecast is read in a window on the left of the instrument.



Even the Smallest Member of the Hiking Family Can Go Along, Riding in This Fashion

### HIKING HARNESS HOLDS CHILD ON WEARER'S BACK

When the family club goes hiking in England, the youngest member may ride on the father's back, sitting comfortably in a saddle supported by harness and holding on to the straps. Offered by a Manchester company, the outfit calls to mind the method used by the American Indian squaw in carrying the youngest member of the family on her back.

### HANDY OILER HAS FORCED FEED AND FLEXIBLE SPOUT

Equipped with a flexible spout for reaching cups or bearings at any angle, a new forced-feed oiler is handy for the serviceman. It is designed for lubricating bearings inside of automobiles, electric refrigerators, cash registers, oil burners, computing machines, elevators, motor boats and other machines. A vent cap prevents leakage while carried in tool kit.



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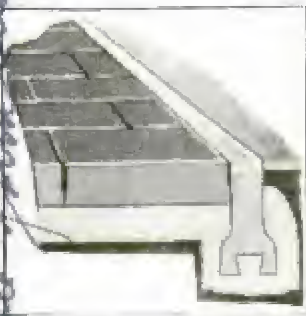
Model of Apparatus for Launching Lifeboats; Three Iron Claws Grasp the Boat and Lower It Gently into the Water

### IRON FINGERS LOWER LIFEBOAT AND MAKE LAUNCHING SAFER

In many sea disasters rescue work has been hampered greatly through inability to launch lifeboats properly. One inventor claims to have solved the problem of launching boats by using three iron claws or fingers which reach up and cradle a boat, lowering it gently into the water regardless of the angle at which a ship lists. The lowering apparatus is controlled by one steel cable and has been successfully demonstrated in model form.

### RUBBER-PAVED TENNIS COURTS REQUIRE NO UPKEEP

Tennis courts made of rubber tiling set in a concrete base and with rubber marking lines embodied in the construction require no upkeep and a machine-surfaced rubber paving for this purpose is neither glossy nor slippery and can be used in winter as well as in summer. After a rain such a court requires only a squeegee rubber to remove the water and final drying with a mop for the surface to be in good condition. The blocks are se-



cured in the concrete by a dovetailed underbody and each block is so constructed that a watertight sealing joint can be made to be used for the pavement. The rubber blocks can also be laid on wood, if desired, or even on the surface of a clay court.

### STAINLESS STEEL PLANE WELDED IN ONE PIECE

Made of stainless steel and welded into what amounts to one piece of metal, a streamlined airplane with 100,000 miles in the air has been retired to a place on the lawn of the Franklin Institute in Philadelphia. Stainless steel and streamlining effects similar to that used in building the "Zephyr," one of the latest streamlined trains, were employed in constructing the plane. The metal is spot welded throughout.



Stainless Steel Frame with Fabric Removed from Wings to Show Its Metal Construction

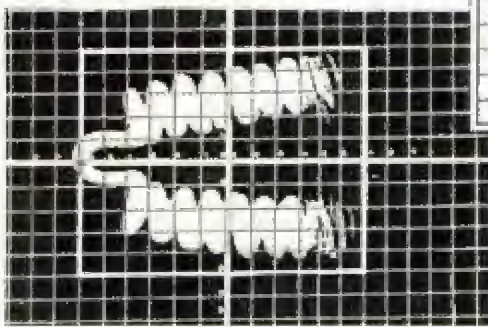
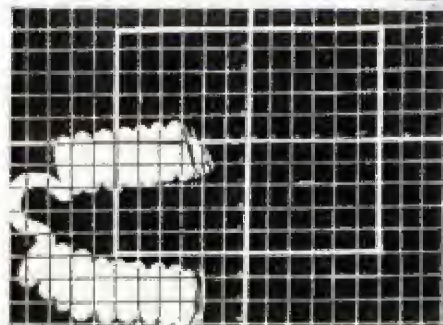
Names and addresses of manufacturers and dealers in articles described in this magazine will be furnished by our Bureau of Information upon receipt of a stamped, self-addressed envelope.



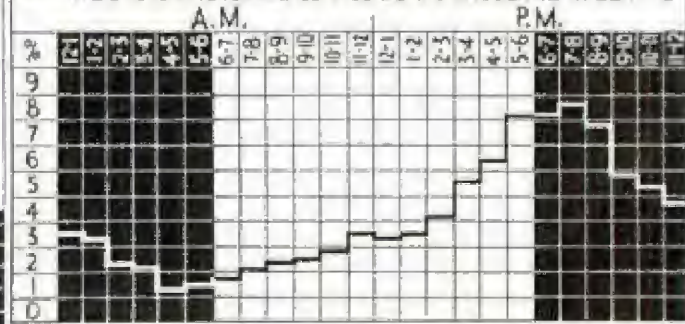
# new menace in NIGHT DRIVING



Above, Glare Resulting from Poor Bulbs; Right, Checking Headlights in a "Safety Lane" with Device Which Measures Intensity of Beams



HOURS OF AUTOMOBILE ACCIDENTS RESULTING IN DEATHS



Above, Note Peak Hours for Accidents; Left, Filament Images of Bulbs; the One Above Is Inaccurate, the One Below Is Correct

**D**ON'T buy "bargain" bulbs. This is the advice of Prof. F. C. Caldwell of the Ohio motor vehicle bureau who says the new pre-focused headlamps with which many current model cars are equipped have brought a new menace to night driving. The pre-focused lamps insure better lighting—provided the bulbs used in them are made to the close specifications neces-

sary for good results. An essential characteristic of the pre-focused equipment is precision and if the bulb used does not fit precisely and does not have filaments positioned correctly, there is impairment of the headlight beam and excessive glare. The only safe procedure is to buy bulbs made by reputable manufacturers. Unless the public refuses to use the lamps of doubtful merit, Prof. Caldwell declares lighting conditions on the highways may be worse than for many years.



D 1256

Cint. John Marley  
Box 292

74

POPULAR MECHANICS

Hollywood Calif

# Huge Tube Built to Film "Sand Hog" on Job



Top, Scene in Giant Tube Constructed to Film Perils of "Sand Hog"; Bottom, Tube as It Appeared on Movie Set

of the East river tunnel in New York, exact to every bolt and nut. Wherever possible, wood takes the place of metal to save expenses, the wood being coated with metallic paint. The gantry, the superstructure housing hoisting engines and equipment, is forty-four feet high. An excavation

Perils of the "sand hog," who helps to drive vehicular tunnels through mud and silt sixty to seventy feet below the surface of a river, are made more realistic in a motion picture by using a giant tube to show actual working conditions. Extending 425 feet across the Fox studio lot, the tube is more than seventeen feet in diameter. Its interior is a detailed reproduction

of 550 cubic yards of earth was made for the hoist shaft. For the final touch of realism, eight mine cars and an electric locomotive were used on the set. Borden Chase, who spent ten years as a sand hog before turning to writing, estimates that mortality in such tunnel work averaged around twenty-five per cent until 1900 when compressed air began to be used.

East River



## SALT BATH SEASONS TIMBER WITHOUT KILN DRYING

Rapid seasoning of certain species of wood without kiln drying is being accomplished at the United States forest products laboratory in Wisconsin. The treatment consists of soaking or boiling wood in a solution of common salt or some other chemical. The salt bath accomplishes in a week or two what usually takes months to do. Kiln drying, following the soaking process, may be dispensed with. The treatment is said to eliminate splitting of the wood while it is being seasoned. Experts are investigating the possibility that the treatment may be used for fireproofing and preserving wood.

## ELECTRIC PENCIL FOR ETCHING OR SOLDERING STEEL

Etching, spot-annealing or hard-soldering can be done on steel or iron with an electric pencil that may be plugged into any 110-volt alternating-current socket. The device consists of the metal pencil and an aluminum case containing a switch and necessary circuits. The etcher has copper stylus tips which are inserted like leads in a mechanical pencil. Steel or metal objects on which names, marks, lettering or numbers are to be etched are brightened



to form a good electrical contact and are then placed on the contact plate forming the top of the case. The marking is done slowly and with moderate pressure. Two ranges of current are available.

## COATING ON ALUMINUM PISTON GIVES LONGER LIFE

Aluminum pistons for automobiles are being made more resistant to wear by a new electro-coating process developed by the Chrysler engineering division. The process gives the piston a coating said to be almost as hard as a diamond. Immersed in a solution of sulphuric acid maintained at seventy degrees, the piston is the anode



One Step in Coating of Aluminum Pistons to Give Them Extra Hard Wearing Surface

for the coating operation. It emerges from the solution with an extremely thin aluminum oxide surface. Aluminum oxide is so hard that few tools can cut it, so all work must be completed before the piston is treated. In tests, the coated pistons have run 100,000 miles without scoring.

## PULL WIND CLOCK FOR DESK NEEDS LITTLE ATTENTION

Little attention is necessary to keep an attractive pull wind desk clock running properly. This clock has in its base a rubber button to which is attached a metal cable. Pulling the cable winds the clock. The wood case is finished in ivory with a black base.



Metallurgical Lab.

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New Haven Conn

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# BRITAIN BIDS for



Building the "Queen Mary" in Scotland; the Vessel Is More Than 1,000 Feet Long and Carries a Power Plant Big Enough to Serve the Needs of a Large City



# ATLANTIC Blue Ribbon



*The "Queen Mary" as She Will Appear in Service; on This "Floating Continent" Great Britain Is Pinning Her Hopes of Regaining Transatlantic Speed Honors*

**T**HAT'S not a ship," said an engineer who witnessed the launching of the gigantic Number 534 at Clydebank, "that's a floating continent"! And so it appeared to the 250,000 people who saw the Queen of England send the white sea bird, now called "Queen Mary," down the ways.

She now floats at her dock in John Brown's famous shipyard, while machinists, decorators, electricians, carpenters and painters groom her for the great transatlantic race which all England hopes will bring back the bonnie blue "riband," long held by the Cunarder "Mauretania." A friendly rivalry between the British and French has created much suspense among maritime nations. The upshot of the race will, of course, not be known until the "Queen Mary" makes her first passage to America, tentatively scheduled for 1935. The new French liner, "Normandie," will precede her by several months.

Competition or no, the "Queen Mary" is a vessel worthy of carrying on the tradi-

tion that England rules the waves. The "Normandie," so far, is 1,029 feet long, a mere eleven feet longer than the "Queen Mary." At the last minute, however, the British may add a bit to the Cunarder's bow and, at least, equal the over-all length of the French liner.

The English claim that the "Queen Mary" will embody the latest improvements can scarcely be disputed. Inside the rakish hull is enough energy to meet the power requirements of a city like Albany, N. Y. According to British engineers, she is the largest power unit ever launched. The electrical transmission system requires 4,000 miles of wire. Lights will flash, wheels will turn, doors will swing, music will play, bells will ring under the impulse of electric current coursing through the walls, ceilings and floors of the ship.

Seven turbo generators, capable of delivering 10,000 kilowatts per hour, will heat, light, ventilate and drive this floating metropolis. Twenty-one elevators, suffi-



D1244

*Here Are Two of the Factors Which Are Expected to Add Speed to the "Queen Mary"; Above Is the Razor-Like Bow of the Vessel and Below, a View of the Streamlined Contour of Three of the Decks*



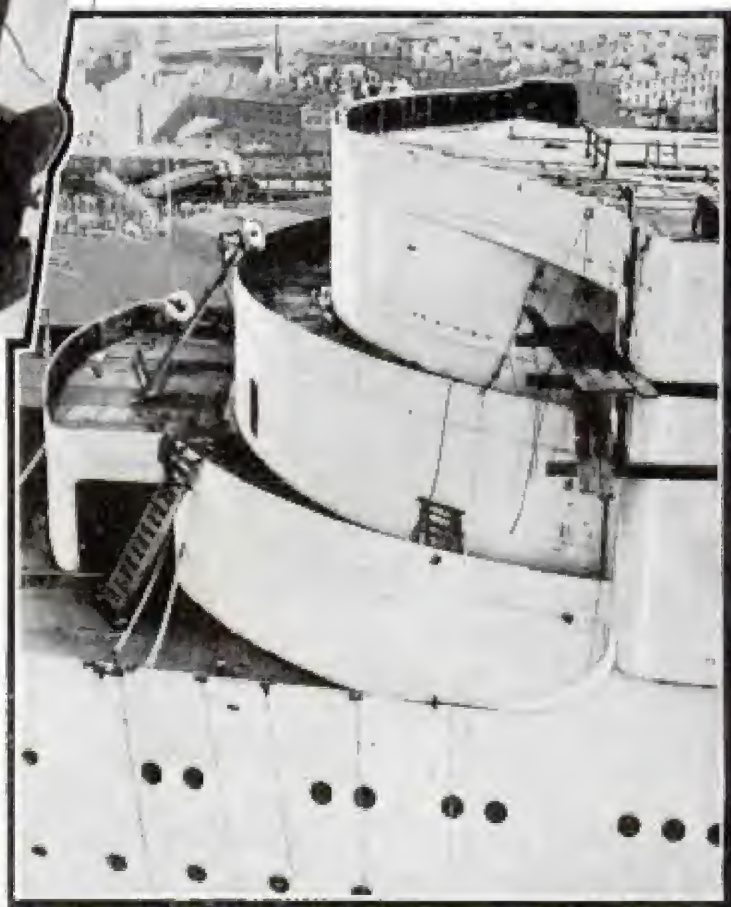
boilers, with single reduction geared turbines.

The propellers are worthy of such a ship. Each costs \$35,000, weighs thirty-five tons, and consists of four streamlined blades. They are composed of resistant manganese bronze and have a diameter of twenty feet. Six fueling stations distributed around the vessel make it possible to fill fifty bunkers with oil in eight hours. The "Queen Mary" will be able to embark and disembark passengers, refuel, take on provisions and start back on her tracks within twelve hours after docking.

As she is, the ship's over-all length is 1,018 feet, her beam is 118 feet, her depth from keel to

cient for a fifty-story skyscraper, will carry the crew, passengers and freight between the twelve spacious decks. To supply staterooms, baths, swimming pools, kitchens and fire plugs with water connections requires about fifty miles of pipe.

Four sets of engines will turn the four propellers and send the 73,000-ton colossus forward at a speed of about thirty-five miles per hour. The space used by turbines, boilers and auxiliary machinery equals the full length of many so-called giant ships. Specialized mechanics must fit the 257,000 turbine blades, and gear wheels are lined up to a thousandth of an inch. The builders claim that the power and efficiency of the engines will surpass any afloat, which means that they must exceed 200,000 horsepower. The foremost marine experts of England devised the propulsion system in a series of secret conferences. They adopted high-pressure, high-temperature steam and water tube

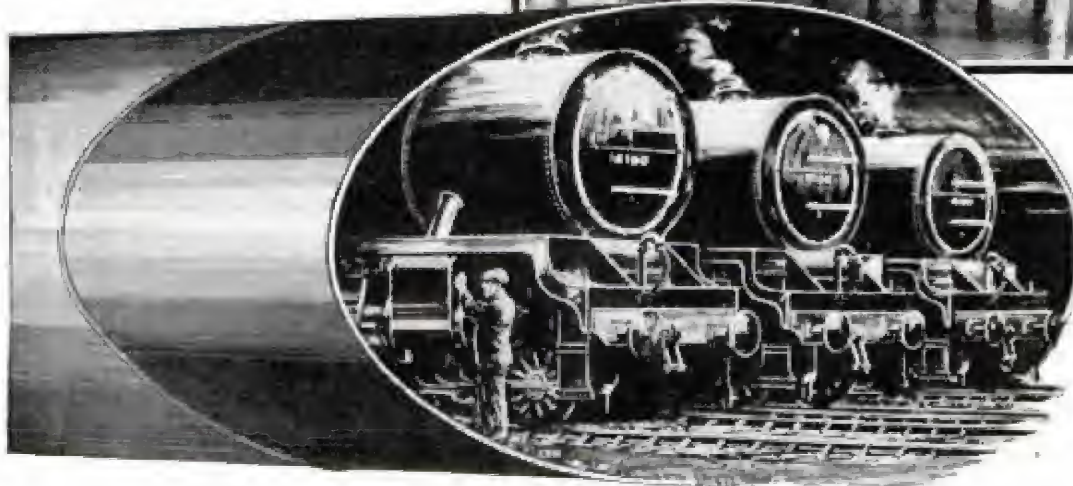
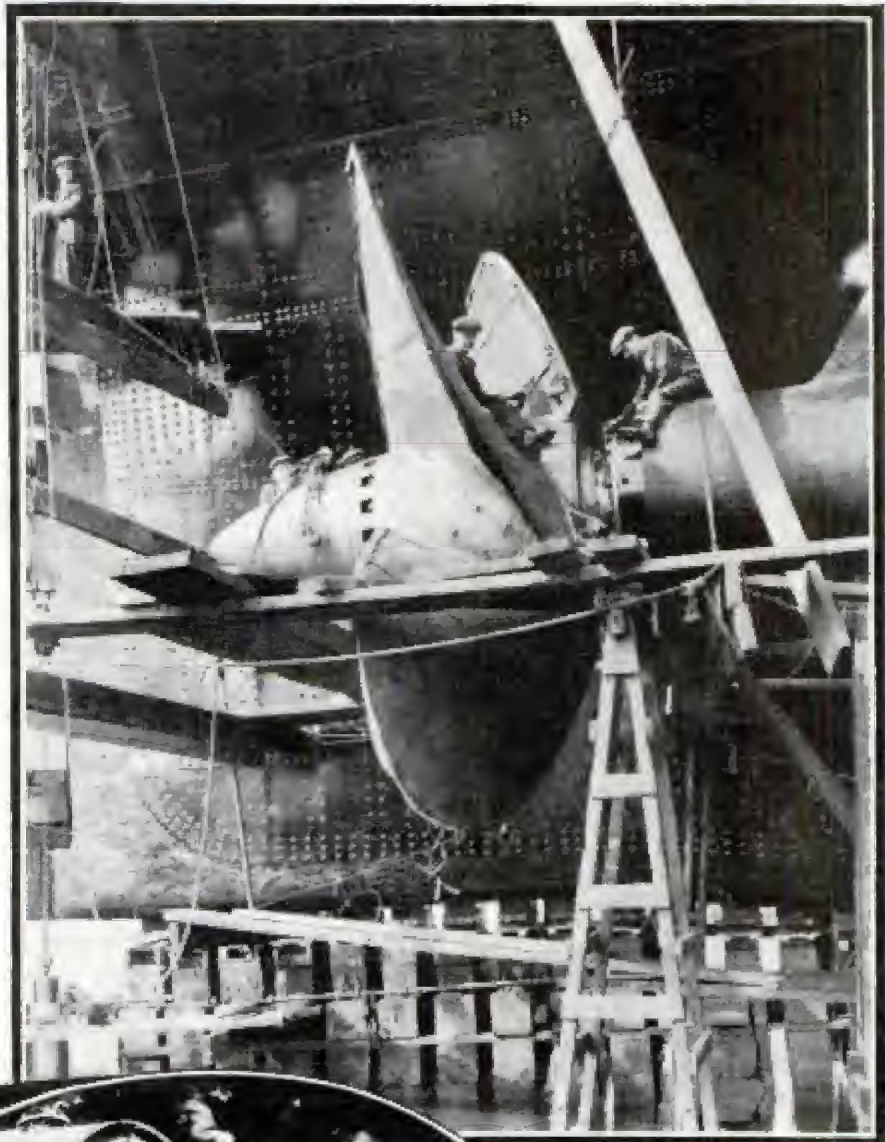


the highest point of the superstructure is 135 feet. With sloping stem and cruiser stern, and three funnels graduated to assist in the discharge of gases, you have the ship's general form. The double hull contains the fuel and water supplies. In all,



there are 160 water-tight compartments below the bulkhead deck, giving her unusual structural strength and a high safety factor.

Baths, showers, wash basins, telephones, thermostats and ventilators are standard stateroom equipment. Four separate water-supply systems will lead into the first-class cabins, giving the passenger a choice of hot and cold, in both salt and fresh water. The public rooms, lounges, verandas, play decks, swimming pools, reception halls, Turkish baths, gymnasiums, tennis courts, and ball rooms will give passengers every opportunity for recreation and exercise, while the third-class accommodations will be superior to the first class of ships fifty years ago. Unusually



*Above, Installing One of the Huge Propellers, Weighing Thirty-Five Tons; Left, Three Locomotives Could Be Placed Side by Side in One of the Funnels of the "Queen Mary"*

large lifeboats with powerful engines, radio transmitters and water tanks, will hang from newly invented gravity davits. Each lifeboat can be lowered, fully loaded, to the water level within a few seconds, under the control of one man. Electric capstans with a combined pull of 400 tons will halve the time now required to draw a great ship safely to her berth.

When the master of the "Queen Mary" sets her course, she will be kept true to

the compass by a powerful electric hydraulic four-ram steering gear. Officers on the bridge will have many ingenious devices to ease their work and to enable them to see not only fore and aft, port and starboard, but also below and above. The configuration of the ocean bottom will be revealed automatically by a depth-sounding device. Submarine signaling, wireless telegraphy and telephony comprise the

(Continued to page 122A)



*Com. Star: Lem Benn  
Owens Jr. 1012  
Washington  
Dayton, Ohio*

### FORTUNE IN POUND OF PIG IRON WHEN MADE INTO SPRINGS

*D 1299*

One pound of pig iron costs the manufacturer less than ten cents, but the same pound, when converted into steel and made into little spiral springs which move the balance wheels of watches, is worth a fortune. These springs, weighing less than one-tenth of a grain each, sell for as much as six dollars apiece. It is estimated that 80,000 such springs, valued at \$320,000, can be made from one pound of iron. In like manner, one pound of cotton, worth only a few cents, can be converted into material valued at from \$15 to \$20. It can be spun into 25,000 miles of thread.

### SHREDDER MAKES EXCELSIOR OF OLD NEWSPAPERS

*D 1236*

Old newspapers and magazines are converted into excelsior for use in packing articles for shipping by running the paper through a shredder consisting of a motor-operated disk of large size carrying three knives which cut against a stationary knife in the frame. As the disk revolves at high speed the knives shear against the stationary blade and cut the paper on the principle of the ordinary scissors. Newspapers, in stacks up to one-half inch thick,



*acme*

Containers in Which Parasite Flies Are Shipped to Wage Battle against Earwigs

### CITY SELLS PARASITE FLIES TO FIGHT EARWIGS

One city adds to its revenues by selling flies, and this year has made about \$2,300 profit from the venture. Years ago, Portland, Ore., became infested with an influx of earwigs. French entomologists discovered an earwig parasite fly and the parasites were imported to eradicate the pests. Now Portland itself is engaged in shipping these flies to other parts of the country where earwigs abound. The flies are shipped in tin cans and are unharmed by long railroad rides.

*D 1235*

### OVAL NAIL WITH CHISEL POINT IS EASIER TO DRIVE

Oval-shaped nails with chisel points are said to be easier to drive, harder to pull, less liable to split the wood and harder to

*non. Skelton*

bend than the ordinary round nail. The sharp chisel point cuts cleanly across the wood grain, allowing the oval shank to enter the wood with the grain, free from fiber distortion.



Shredding Machine Which Converts Old Newspapers and Magazines into Excelsior

are fed into the shredder on rollers and the shredded paper passes into a discharge spout at the base of the machine. The capacity of the shredder is about 1,200 pounds per hour.

*Mitty & Merrill  
Saginaw, Mich*



## DUMMY BELL BOYS HOLD CARDS ANNOUNCING SPEAKERS

At a recent session of the National Safety Congress twenty-six dummy bell boys served as guides for those in attendance. In previous years it was necessary to have an attendant for each meeting room as there were more than 100 sectional meetings and nearly 400 speakers during the five-day session. This year dummies were cut from plywood and painted to represent bell boys, one being placed at the door of each meeting room. Clips at the top of the board held by each dummy were used to clamp into place signs denoting the session in progress. Holders made of wire contained the name of each speaker as he appeared on the platform, the signs being changed as the speakers changed, so that visitors could tell at a glance the session which was in progress and the person who was being heard at the moment.



These Dummy Bell Boys Served as Guides for Various Sectional Meetings of a Recent Convention

## NON-SPARKING TOOL METAL REDUCES HAZARDS

Sparks flying from steel tools have caused many fires and accidents. Now a non-sparking metal for tools has been produced to reduce these hazards. The metal is an alloy of copper and beryllium. Heat treating of the alloy results in a tough, hard material of high tensile strength.

Stanley Tool Works  
New Britain Conn

Built by George Trier  
125 S. Chester Ave.  
D/298  
Park



Miniature House, Resembling a Log Cabin, Is Made of Empty Rifle Cartridges

## MODEL HOUSE OF CARTRIDGES MADE BY SOLDERING

Empty twenty-two caliber cartridges, about 1,500 of them, are used in a miniature one-room house produced by George Trier of Illinois. The house is complete, even to the chimney made of the shells. Two and one-half pounds of solder were used in the small structure, which closely resembles a log cabin. Only the windows and door are not made of the cartridges. Approximately eighteen hours of spare time work were occupied with the task.

## AUTOMOBILE KEY EJECTS ITSELF WHEN DOOR IS LOCKED

For the forgetful motorist who parks his car and walks away leaving the key in the ignition lock or door, one inventor has made a self-ejecting key which springs back into the hand as the



key is turned to the locked position. A strong spring is installed in a slot in the key shank. Studs coil the spring as the key is inserted in the lock, and release it on withdrawal.

D/268  
Columbus, Ohio  
Ivan, Rudge Ave.  
D/268  
Ivan, Rudge Ave.  
D/268



D7256

Col. John L. Connelley  
3107 - 19th St. N.W.  
Washington D.C.

# The RACE HORSE



**C**AN the doping of race horses be stopped? Uncle Sam is taking steps to do so.

Last year federal agents working under cover during the racing season made the startling disclosure that over 300 horses in as many races at leading tracks were doped. The doping of horses consists of some of the most inhuman practices conceivable. Tongues are pulled forward and their "swallows" rubbed dry. Then on the base of the tongue powdered heroin is spread. This "hop" makes a horse run wild until he literally drops dead in his tracks. Or, thirty minutes before a race, the horse is drenched through the mouth with a liquid caffeine mixture containing heroin, strychnine, digitalis and other stimulants. Or a hypodermic needle is thrust into the neck and heroin is injected directly into the bloodstream.

*Why Dope Horses Which Naturally Run Like This?  
Below, a Small Tin of Oriental Dope*



# DOPE *Racket*

To wipe out this racing evil veterinarians and chemists from every racing state met recently with Commissioner H. J. Anslinger, chief of the federal narcotics bureau at Washington. The result was a resolution to form a central bureau in the treasury department for the purpose of research and study necessary to unify the procedure to be followed by each state racing commission in de-



Above, Making Saliva Test of Race Horse; Below, These Hypodermic Syringes Were Confiscated at a Nationally Known Race Track

tecting and preventing doping. Also steps were taken to bring into line those states which do not fully enforce their anti-doping laws.

During the meeting a demonstration was given of the saliva test, widely used in Europe to prevent doping. This consists of inserting into the horse's mouth a gauze pad saturated with distilled water which, as he masticates, produces a flow of saliva. This saliva is captured in a basin and with it other saliva taken from the mouth by

drying it with a pad of dry gauze. Examination of the saliva by a chemist shows the presence of strychnine, heroin, digitalis or other drug, in which case the horse is not permitted to race.

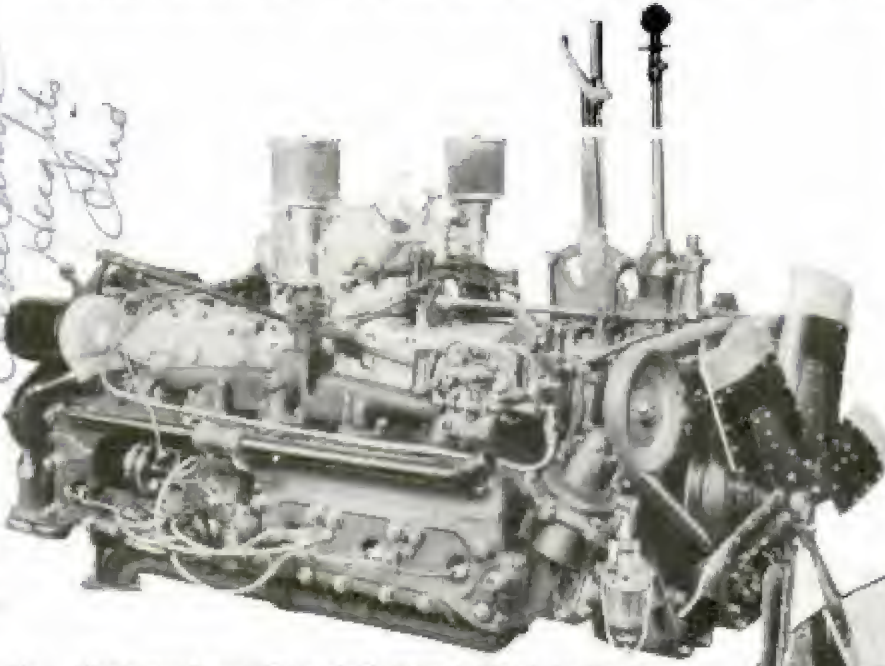
Nearly all the states now permitting racing have adopted the dope-box saliva test. This means that before horses are permitted to race in these states they will be examined for the detection of dope. In addition, California requires that racers be in a receiving barn or paddock an hour before a race starts. "If we had such a regulation as this applying to the country as a whole," says Mr. Anslinger, the racing dope evil would be greatly curtailed. The effects of a drug would wear off before a race, or at least permit us to know whether a horse had been doped or not."

The purpose in doping horses is to make them "race up." A hypodermic of cocaine or heroin has the same stimulating effect on horseflesh that a stiff drink of liquor has on a man. He feels cheerful, full of pep and ambitious to run. Physically, however, dope has a depressing effect on a horse. For this reason strychnine is given along with heroin. Strychnine is a powerful heart and muscle stimulant. Cocaine

(Continued to page 122A)



# "Pancake" Motor Drives Streamlined Truck



Top, Horizontal or "Pancake" Motor Used in New Truck; Right, Short Front of Truck Designed to Decrease Wind Resistance; Note Driver's Position

Powered by a twelve-cylinder, 130-horsepower engine of horizontally opposed or "pancake" design, a new streamlined truck embodies some unusual features. To aid streamlining, the engine house at the front has been removed entirely, the pancake engine being mounted under the truck just over the front axle. So placed, it has been possible to incorporate the engine controls in one assembly. Thus, the radiator, instrument panel and emergency brake together with the motor, clutch and transmission are mounted on a sub-frame and can be removed from the truck as a unit. The pancake engine has removable

cylinder sleeves that may be replaced when necessary, eliminating cylinder re-boring. Exhaust valve seats are made of stellite, a heat-resistant alloy. The crankcase and four cylinder blocks, each containing a bank of three cylinders, are cast in one piece. The transmission has five speeds forward and one reverse. It is claimed that gasoline con-



sumption is less than that of a six-cylinder engine of smaller displacement.

## Motorcycle Sidecar with Top Has Spare Wheel Space



Special Sidecar for Motorcycle, with Cover of Spare-Wheel Compartment Opened

Fitted with a top to protect the occupant from the weather, a new sidecar for the motorcycle has space for a spare wheel and tire. The spare wheel fits into a compartment at the back of the sidecar, a cover giving easy access to the wheel in case of trouble. The sidecar was designed by Japanese engineers.

Names and addresses of manufacturers and dealers in articles described in this magazine will be furnished by our Bureau of Information upon receipt of a stamped, self-addressed envelope.

No further data.

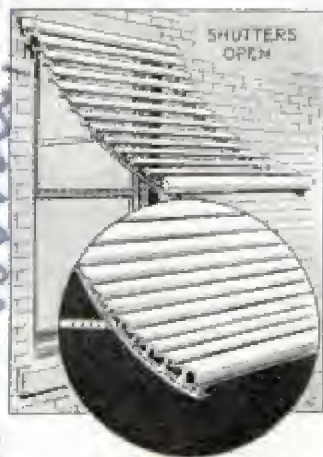


## GLASS ABSORBS HEAT OF SUN BUT ADMITS LIGHT

Window glass has been developed which takes the heat out of sunlight but permits the light to pass. The heat-absorbing glass contains iron, and objects viewed through it have a greenish-blue color because some of the red rays of sunlight have been removed. Small amounts of iron in glass absorb ultraviolet and infra-red, the heat rays of sunlight. The visible part of sunlight contains only one-third of the heat in the sun's rays and the new glass cuts out the invisible rays but permits most of the visible rays to pass. While the heated glass might be expected to raise the temperature of a room as a whole, the effect on a person in the direct sunlight is much less than for ordinary glass. The glass is particularly suited to offices and factories.

## ALL-METAL WINDOW AWNING IS ADJUSTED BY LEVER

Controlled by a single lever that is operated from the inside of the house, all-metal window awnings now on the market are fire and weather proof. The awnings do not have to be taken down in the fall and put up in the spring. To have the



awning as a shade, it is only necessary to raise the adjusting lever. This causes the shutters to close and to shed the light, rain or snow. The lever also opens the shutters to let the breezes and sunlight pass. Easy installation is another feature.

## RECORD OF MILES PER HOUR KEPT BY SPEEDOMETER

One speedometer now offered not only tells the miles per hour, total mileage and trip mileage, but also keeps an exact record of the miles per hour traveled at all times during a trip. While a disk revolves in the speedometer head, a moving pencil-needle, actuated by the same mechanism that controls the mile-per-hour indicator,

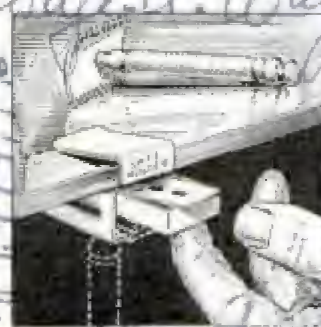


© Paramount Productions, Inc.  
This Speedometer Keeps a Chart Record of the Miles per Hour Traveled during a Trip

marks a chart affixed to the disk. At the end of a trip, the chart can be removed to preserve as a record, and a fresh one inserted. The record enables the car owner to learn the most economical running speed and to keep a close check on fuel and oil consumption. It is also a verification of speed in case of accident.

## RAZOR RACK AND BLADE HOLDER CLIPS TO CABINET SHELF

Safety razor and ten new blades may be stored neatly in the medicine cabinet by clipping them into a combination rack and holder that clamps to the shelf. The razor hangs handle down, while a small drawer just above holds the blades. An automatic stop prevents the drawer from falling out and spilling the blades. The device is attached to the edge of the shelf, utilizing the underside. It is offered in several colors.







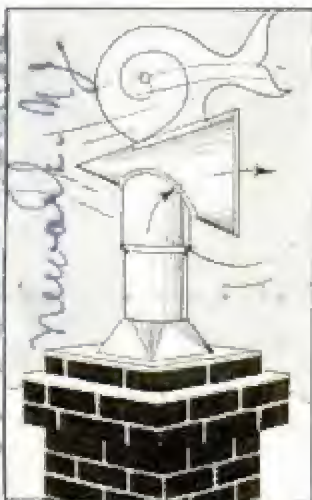
Throwing Stick Used Instead of Bow to Shoot Arrows; It Was First Employed by Mayan Hunters

### ARROWS THROWN WITH STICK INSTEAD OF BOW

Ancient Mayan hunters used a "hulche," or throwing stick, instead of a bow to shoot their arrows great distances with deadly accuracy, and the weapon is being revived in modern sport on the Pacific coast. Archaeologists found specimens of the throwing sticks in Yucatan. These were brought back and have served as models for sticks being used by archers today.

### REVOLVING TOP FOR CHIMNEYS CREATES BETTER DRAFT

Combination smoke cowl and ventilator, a revolving top for chimneys, is available



for the purpose of creating a better draft for the furnace. The top part of the device turns and is so arranged that the wind keeps the mouth or open end away from the direction in which the wind is blowing. This creates a vacuum, setting up a draft from the flue through the cone

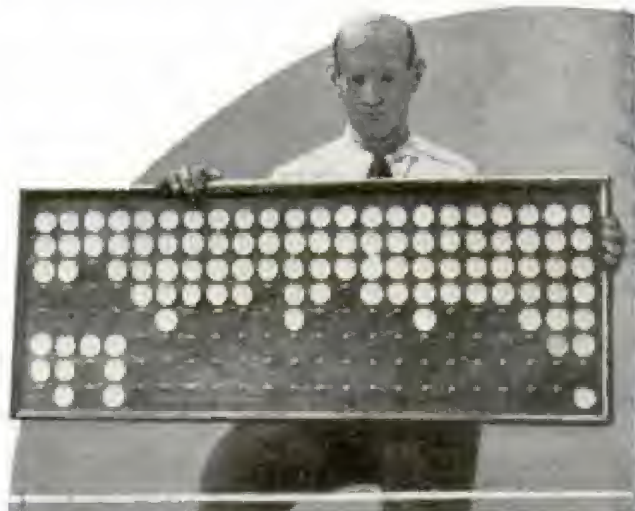
and out. The top also can be used as a ventilator.

### RADIO COMPASS LEADS FLYER TO BROADCAST STATION

Pilots flying over oceans or unknown routes are enabled to find their way directly to any broadcast station by using a long-range automatic radio compass consisting of an indicating dial mounted in the cockpit, an aircraft radio receiver and compass converter unit, a dynamotor and a loop antenna mounted in the fuselage, the complete assembly weighing less than forty-five pounds. When within range a pilot may tune in on a station by using earphones. If the ship is headed directly toward the station the indicator dial needle points to zero. If it is off course, the needle points to left or right as the case may be. The instrument also enables a pilot to locate his position over land or sea. To do this, he tunes in several stations, determines their direction, and by a system of triangulation fixes his own position.

### TAG BOARD SHOWS LOCATION OF CABLE REELS IN YARD

To indicate the exact positions of heavy cable reels in storage yards, an employee of a telephone supply company devised a tag board indicator. Each reel is assigned



Tag Board Used to Indicate the Exact Location of Heavy Cable Reels in a Storage Yard

a given position in the yard and its exact location is indicated on the board which is equipped with pegs from which circular tags are hung. Each tag contains information as to the size and quantity of cable on the reel it represents and is hung in a position corresponding to the location of the cable in the yard.

Western Electric Co  
Branch at Syracuse, N.Y.



D 1801

55% OF ALL MACHINERY IN THE COUNTRY IS MORE THAN 10 YEARS OLD

# MEN WANTED

AMERICA NEEDS  
400,000 NEW  
HOMES EVERY  
YEAR

3,000,000 HOMES  
NEED MODERN  
LIGHTING

MORE THAN 10,000,000  
HOMES NEED A TUB  
OR SHOWER

56% OF CITY  
HOMES HAVE NO  
CENTRAL HEATING

*Under Government Auspices, Investigators of the Real Property Inventory Are Making a Survey of American Homes; These Figures Represent Findings from the First Million Homes Canvassed*

Washington, D.C.



*W. H. Young  
Cincinnati  
Ohio*

tion and noise are practically eliminated. Less power is required and less wear results from operation, due to fewer parts and that the pistons travel in a screw-like motion in the bore.

*D/222*

### AIR DUCTS MAKE SOAP FLOAT

*Pat. 10/20/31*

Any soap can be made to float by manufacturing it by a process that presses air ducts into the bar. These ducts also speed up curing, permitting the soap to dry out from the outside. So small are the ducts that they retain air,

preventing water from entering. This results in floating. The old method was to beat air into the soap before it was shaped into bars. This made the soap porous, since it was filled with minute air cells.

### BACKING LIGHT WARNS DRIVER OF THE CAR BEHIND

*D/299*

Drivers at the rear can be warned of an intention to back up if the automobile is

### SCULPTOR USES BLOWTORCH INSTEAD OF CHISEL

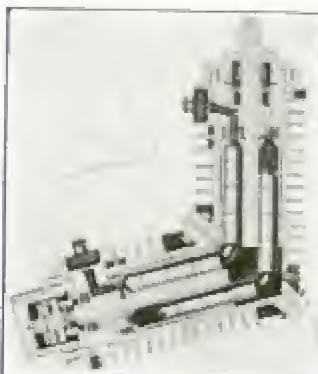
One California sculptor works with metal instead of marble or clay and uses a blowtorch instead of a chisel. He builds up grotesque figures of wrought iron, modeling the hot metal with the aid of an acetylene torch, a welding rod and a pair of pliers.

### SIMPLIFIED GAS COMPRESSOR FOR QUIET REFRIGERATION

Refrigerating machinery can be made to operate almost silently by use of a new, lightweight gas compressor. Piston rings, piston pins, crankshafts, connecting rods, gears, cams and valves are omitted from the compressor. Its cylinders are bored in cylindrical blocks, each of which resembles the cartridge

chamber of a revolver. When pistons are inserted in the cylinders, the rotation of a cylindrical block causes the pistons of both blocks to work back and forth, compressing the gas in them.

The new design reduces the weight of the compressor by forty-five per cent. Vibra-

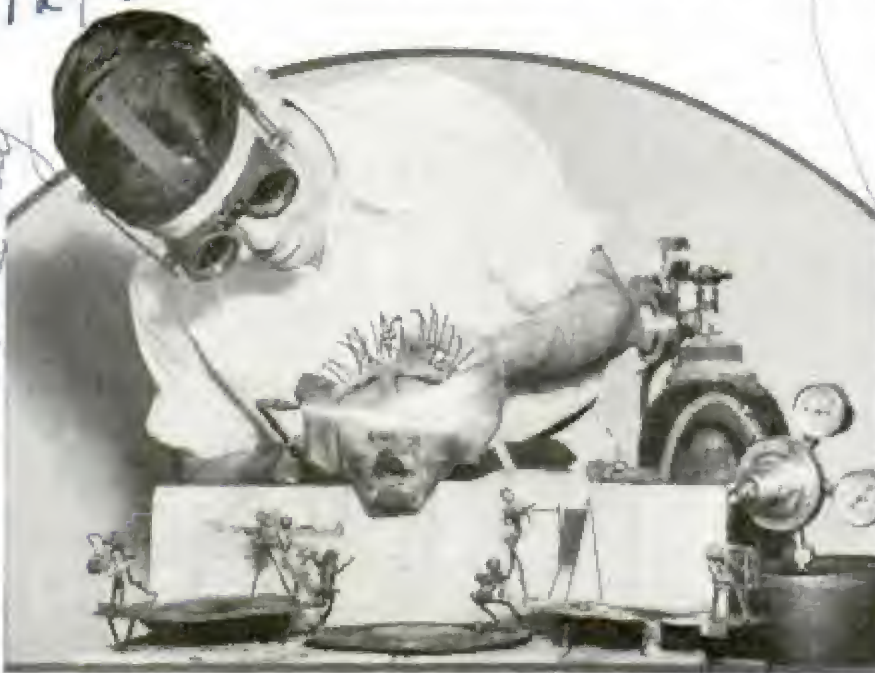


Reversing Signal Which Lights and Sounds Horn When Gears Are Shifted

equipped with a reversing signal devised by an English inventor. When the car is shifted into reverse, this device automatically sounds a horn and a light at the rear illuminates a glass disk with the word "Reversing" on it.

*Thermal Units Mfg Co.  
1112 and 1114 Madison Road*

*James Clewley, Santa Madre Calif*



Making Grotesque Figures of Wrought Iron with the Aid of a Blowtorch, a Welding Rod and a Pair of Pliers

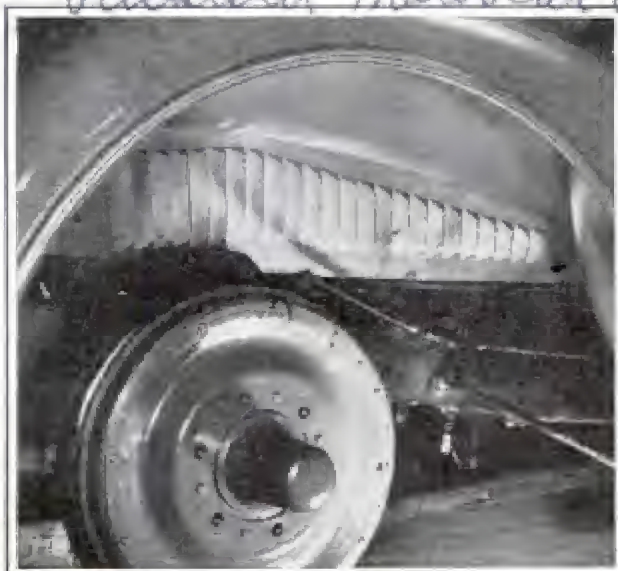


**BLUE STAR LIGHT IS DEATH RAY  
BUT AIR PROTECTS EARTH**

If it were not for the atmosphere above the earth, all life would be wiped out by the rays from huge "stars of death." The Smithsonian Institution has found that virtually all of the blue stars emit death rays which, however, are screened out by a layer of ozone high in the earth's atmosphere. These stars have a surface heat of 36,000 degrees Fahrenheit, three times as hot as the sun, but they were found to give off few of the sun's beneficial type of ultraviolet or heat rays.

**LOUVERS UNDER FRONT FENDER  
VENTILATE ENGINE**

Engine heat is kept out of the passenger compartment of one make of motor car by louvers located under the front fenders. Heat from the motor passes out through these louvers and, traveling down along the under side of the fenders, is carried away beneath the car. With such an arrangement, ventilating openings in the hood can be made smaller and given an ornamental treatment heretofore impossible. The plan also prevents engine heat from entering through the open windows.



Louvers under Fenders Dissipate Engine Heat and Keep Passenger Compartment More Comfortable

Inquiries as to makers of articles described in Popular Mechanics, will be answered by our Bureau of Information upon receipt of return postage.



As Pianist Touches the Keys, Colors Corresponding to Notes Appear on White Disk

**PIANO PLAYS MUSIC IN COLOR  
ON WHITE DISK**

Different notes in a composition are reproduced in color on a white disk by a piano exhibited recently in London. The colors appear on the disk as the music is heard. Each note has its own color.

**PEN REST FOR EASY WRITING  
GUIDES THE POINT**

Writing without the usual fatigue is made possible by using an attachment for a pen. The device projects from the pen staff just above the point, serving as a rest and helping to steady the hand. The user is enabled to hold the pen point at the proper angle to write a certain style, making the device an aid in learning penmanship. In addition, the attachment contains a point that holds sufficient ink for writing two pages before being dipped into the writing fluid again. The point is stainless steel.



Miss Mary K. Gude.  
303 W. 89th St.  
New York.



Westinghouse X-Ray Co. 21-16-43rd Ave. Long Island City N.Y. 1308

Taken by Harold O. Petersing, Westinghouse X-Ray Co. Brooklyn Museum.



# X-RAY

## The MASTER

Miss Anna O. Dooley, Curator, Field Museum



Taking X-Ray Picture of Mummy of Child and, Left, X-Ray of Mummy on Film Seven Feet Long and Two Feet Wide

Los Angeles Field Museum

By KENNETH CRIST  
1158 W. Vernon Ave.  
THERE is in this world a "Sherlock Holmes" far greater than Conan Doyle's fantastic wizard; not a man, not a genie, not even a ghost. It is the strange, invisible cyclops of science that sees all, reveals all, and possesses the power to bombard your body with billions of tiny projectiles. It is the mightiest of all detectives and, because it mystified experts, you learned to call it X-ray.

With this magic eye you can look through five inches of solid steel. You can check metals for tensile strength, examine

boxed candy for foreign particles, or explore a child's stomach for a swallowed button. You can spot defects in castings, in welds, and in rubber. You can find out what is wrong in hidden assemblies, tell frosted oranges from fruit that is good, remove hair, sterilize criminals, or expose broken bones in the human frame.

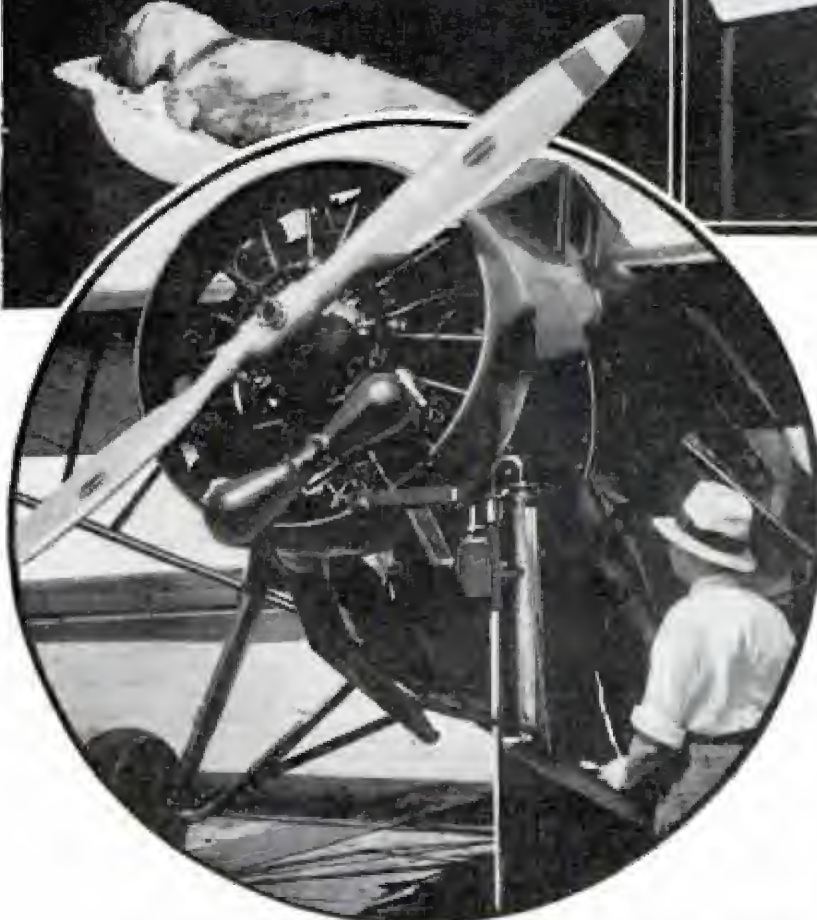
Without it your shoes might fail to fit your feet, the police would lose a snare for forgers, "doctored" pictures could be passed off as masterpieces, and electricity would splutter to naught as a treatment for cancer. Yet, if it had not been for a common latch key tossed carelessly to a



Dr. Jesse W. M. Hummer, D1308  
 Research Institute, Phillips  
 California

Right, Using "Cross-Eyed" X-Ray,  
 a Three-Dimensional Machine Which  
 Makes It Possible to Measure Inter-  
 nal Body Cavities

1201 California St  
 Pasadena  
 of **MAGIC**  
 Calif. Institute of  
 Technology



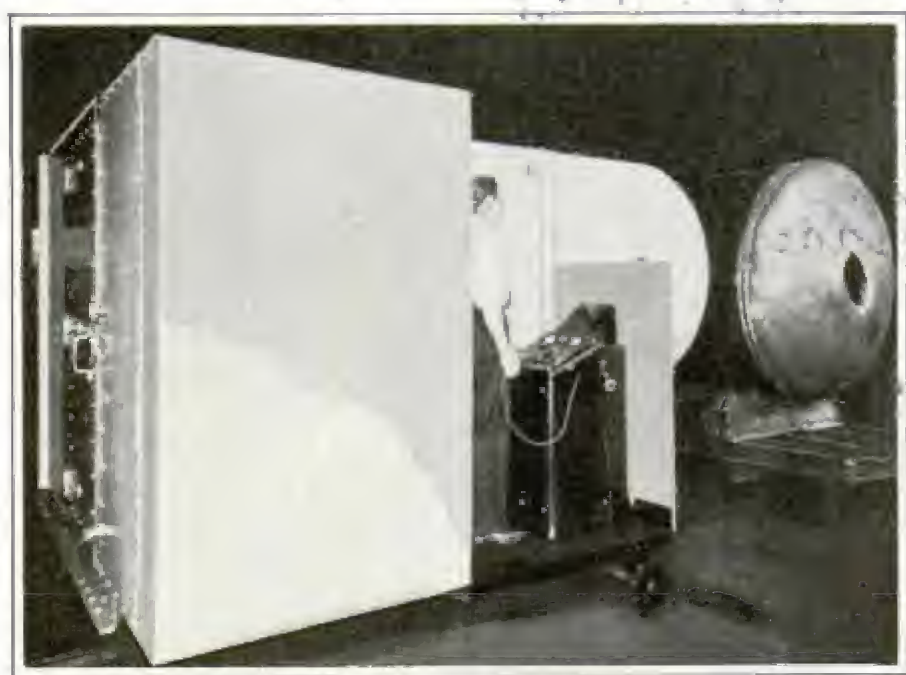
This Small Portable X-Ray Unit Is Being Used to Inspect  
 Airplane Parts and for Work on Construction Jobs Outside  
 the Laboratory

desk in Bavaria you might never have had the X-ray! Dr. William Konrad Roentgen entered his laboratory at the University of Wurtzburg and thoughtlessly flipped his key at a desk in which there was photographic film. There were experiments to do with a vacuum tube and the known Lenard rays.

When darkness came Dr. Roentgen saw a strange and eerie illumination appear in the tube's vicinity. It was a glow that science did not know and he got out his film for a picture. When he developed his negatives he was amazed to find a photograph of his key. There was just one way to explain it—the glow had passed through his desk!

He announced X-ray in December, 1895. Within a year machines





far shorter than that. You have to forsake the "mu" and adopt the Angstrom unit with its symbol, "A," denoting .0000000001 meter, to continue through the spectrum sequence.

You can see red light at 7,000-A, a part of the visible spectrum. Between red light and ultraviolet fall all other spectral colors. In the ultraviolet "band" below 1,800-A you have to work with a vacuum tube or else the air will absorb the radiation. When you get below 500-A you leave the ultra-

violet and come within the scope of what are called "soft" X-rays. As you shorten the X-ray wave length you increase its power. You can get X-rays so short by using a 600,000 to 800,000-volt transformer that they actually bridge the gap between light and radium radiation!

Because this is true, your



were functioning in the major centers of the earth. Always, however, there remained the "X"—that mute, algebraic symbol of mystery. It took modern science to expose to you these truths:

In the spectrum sequence there come radio waves, heat waves, visible light, ultraviolet, and then X-rays. All of these phases pass through ether in a wave-like path at 186,000 miles a second. They are not all the same for the reason that each has a different wave length.

If you measured the longest radio wave you would find it about 10,000 meters from crest to crest, a distance approaching five miles. It is possible, however, for a radio wave to be as short as one-half an inch. You figure a meter at 39.37 inches and then take a millionth of that, called a "mu," to measure the shortest heat wave. Yet, there are waves



Top, High-Voltage X-Ray Plant for Examining Steel; Center, the Orange at the Left Wax Frozen; That at the Right Was Good; Bottom, Weatherproof Portable X-Ray Unit

physician has a range in the X-ray wave length he selects in treating his patients. If he is handling a cancer case he may use a radiation a thousand times as strong as the one he would need to examine your broken rib. There was a time when the



medical profession controlled the X-ray field. That day is gone, for industry has adopted the magic eye and turns it on its products. All of the seventy-five miles of steel welds in the Boulder dam penstocks are being checked with X-ray. That one job involves 24,000,000 square inches of film and 159,000 separate X-ray exposures!

Airplane manufacturers, motor car plants, and engineers installing high-pressure steam lines frequently X-ray their castings. They know that the pictures they get will show up all shrinkable areas, gas voids, cracks, or "worm holes" caused by using a sand that is too wet. Because metals are made up of crystals an X-ray will tell you exactly what to expect in tensile strength. When you roll silver, copper or iron into sheets or draw it into wire you deform its natural crystal structure. Then you heat-treat to produce the desired mechanical properties. If you want to know exactly what happened you turn to X-ray analysis. It will tell you how the little cubes that build up the crystals are oriented in respect to the geometry of the whole. Upon this orientation depend the metal's elastic properties.

It has made its debut in the tire business and reveals fiber formation in rubber. If you go in for buying paintings you had better check up with X-ray. That way you can keep from being fooled with spurious "old masterpieces."

X-ray in the hands of police will reveal the forger's pen. It will spot re-tracings on questioned documents and befuddle the smoothest defendant. It closes the door to chicanery and fake and gives you scientific protection.

Modern X-ray safeguards your life, saves your money, serves your business, defends your health, prevents accidents, treats your ills, and helps to keep you from being swindled. What more can you ask—even of Sherlock Holmes?

### MIDGET COW ONE YARD LONG IS A FAMILY PET

Two years old and three feet long, "Mabel," a perfectly formed Aberdeen Angus heifer, is the pet of a West Virginia family. The cow's parents are of normal size but Mabel is only twenty-nine inches high, one yard long and weighs only 140 pounds.



*dmh*  
This Midget Cow Is Two Years Old but Weighs only 140 Pounds and Is Less Than Thirty Inches High

A sub-normal gland is believed to have been responsible for her midget proportions. The animal follows children of the family around like a dog.

### D1325 DOUBLE-LIGHT HAND LANTERN WORKS ON DRY BATTERIES

Equipped with a double light, one a spot beam in front and the other a floodlight at the bottom, a new hand lantern operates on dry batteries. Either light may be brought into instant use by flipping a double-action switch. The lantern is compact,



*Wild Cat*  
standing only four and one-half inches high. The metal handle has a key slot for hanging on a nail or rope. Provision is made for hinging so the lantern can be placed upside down with the floodlight at the top. Made by Delta

Electric company, the lantern has a circuit that permits operation on either two or four standard one and one-quarter inch flashlight batteries.

*Delta Electric Co.  
Marion Ind*



# Diving Lamps Aid Hunt for Sunken Gold



Top, Examining Diving Apparatus and Lamps; Right, How Outfit Appears Moving along River Bottom

Huge lamps, especially designed for the purpose, are being used in an underwater search for the wreck of the British frigate, which is said to contain \$4,000,000 in gold. The search is being carried on at the bottom of the East river, near Hell Gate, at New York. The special lamps, three of which are used with diving equipment, illuminate large areas of the river bottom with a combined power of 7,000 watts. With the lamp attached and switched on, the diving outfit resembles some strange monster moving slowly about the bottom and carrying its own flares. Designed by the Westinghouse Lamp company, the underwater battery was tested in the East river before the actual treasure hunt began, thus demonstrating its effectiveness

under working conditions. The sunken ship, the "Hussar," is believed to contain \$4,000,000 sent across to pay British soldiers and sailors during the Revolutionary war.

## RAILROADS TO SAVE MILLIONS BY WELDING RAIL GAPS

If the small gaps between rails were not there, it is estimated that five years would be added to the life of railroad rails with a saving to the industry of \$180,000,000 a year in decreased depreciation. And the railroads believe they have found the key to the problem in welded joints between the rails, making the track two continuous pieces of metal. Gaps between rails have been thought necessary because of the expansion and contraction of metal in hot and cold weather but engineers have found there



is a wide difference between the theoretical expansion and the actual expansion. In America the change is only one-third that calculated and experimental sections of track have been welded without any trouble resulting. The plan is to weld the rails in summer when expansion is greatest. In winter the rails try to shorten and stress on a given cross-section may rise as high as 247,000 pounds to the square inch, but this is well within the elastic limits of the steel and of the weld.

Super Service

10/8/34

Westinghouse Lamp Co.  
150 Broadway New York

Empire Marine & Salvage Co., 154 Nassau Street New York

Underwater Search, Hudson



## GAS AS FIRE ALARM FOR SHIPS WAKES PASSENGERS

Some new means of arousing passengers when fire breaks out aboard ship is being sought as a result of the "Morro Castle" disaster, in which there was heavy loss of life. A clinical laboratory has devised a method that dispenses with bells and sirens, using instead a gas. Introduced into the ship's ventilating system, sulphur dioxide would be carried to every part of the ship, quickly becoming so irritating that all passengers would awaken. Sleep with this gas present in the room is said to be impossible, making such a system a positive alarm in case of fire. The gas is not released in quantities sufficient to result in injury, its flow being carefully regulated by sensitive control valves.

## GAUGE TESTS GASOLINE PUMP AS AUTO ENGINE RUNS

Testing the gasoline pump on the automobile is made easy by a gauge that works while the engine runs. The gauge checks up on the suction and pressure pull of the



Efficiency of Fuel Pump Is Tested Easily by Gauge That May Be Attached While Engine Runs.

pump and the fuel delivery system. Leaking valves and fuel lines, as well as defective diaphragms may be detected quickly with the device.



This Instrument Keeps a Continuous Record of the Depth of the Sea Bed

## DEPTH OF SEA BOTTOM SHOWN ON CHART BY RED LIGHT

One of the safety features of the mammoth new British liner, "Queen Mary," is a depth finder which operates a pencil and shows by a graph the depth of the sea bed at any time. The graph is horizontal so the record is seen in its true perspective. At night a red light flashes every three seconds on the dial, giving a visual indication of the depth. Changing charts is easy and current to run the fathometer is supplied by the vessel's own generating plant.

[The Chinese were the first to use fingerprinting, applying thumb prints as seals on legal documents.

Croftley Instrument

14 S. River St. 1911

Carl L. Lamm  
Benn Owens

Submarine Signal Corp.  
London, D. W. I., England  
New York  
145 Hudson St.

Echlin...

D/260

D/297



W. K. Kaper, George  
Watkins, Lifeguard  
Corps  
Santa Monica,  
Calif.

Benjamin Stevens Jr.  
D1240  
Washington D.C.



Using a Paddleboard Equipped with a Water Glass and Eye-Piece in Searching for Articles Lost by Bathers

### WATER GLASS IN PADDLEBOARD HELPS FIND LOST ARTICLES

Life guards at Santa Monica, Calif., use a paddleboard equipped with a water glass in searching for lost articles which have been dropped into the water. The plate glass is fitted into the bottom of a hollow paddleboard and an eye-piece is attached to the top, so the craft is operated like a miniature glass-bottom boat. It has been used for locating lost anchors and cables in the yacht harbor and for quick search of the ocean bottom at depths of from thirty to forty feet.

### FURNACE FIRE STARTER IN BAG ELIMINATES KINDLING

Coal furnace fires can be started quickly and without the work or muss of preparing kindling by using fire starters contained in small Cellophane bags. The package is lighted and tossed into the fire box and coal placed around it. Then the door is closed and the draft opened until the coal is burning. The bag contains a shredded material which is



a by-product from the manufacture of shoe soles and heels. This material is a combination of cotton, zinc, sulphur and rubber and a small amount of it becomes hot enough to ignite coal. The zinc assists in removing soot, the sulphur causes flaming and the cotton and rubber prolong the heat until the coal is burning.

### THOUSANDS OF TINTS USED BY MOSAIC WORKERS

About 15,000 varieties of colors are employed by mosaic workers in Rome, and there are about fifty shades of each of these colors, thus offering 750,000 tints which the trained artisan can distinguish easily. With three-quarters of a million tints from which to choose, it might be thought that the most varied and beautiful paintings could be faithfully copied, but the mosaic workers complain that they need still more varieties from which to select.

### "T.R.'S" FACE CARVED ON CLIFF MARKS ROOSEVELT ROAD

Appropriately marking the Roosevelt highway in California, a sculptor has



Covered with Cement, This Head of Theodore Roosevelt Overlooks Highway in West

carved a likeness of the face of Theodore Roosevelt on a cliff by the road. The face is coated with cement to make it more permanent. The sculptor caught much of the dynamic "T.R.'s" personality in his art.







# NEW for YOUR



*Left and Below, Two-Leg Table That May Be Used with Chair or in the Automobile; User's Lap Supports One Side; Legs and Braces Are Steel and Are Adjustable for Height; Front Corners Are Cut Out to Allow for Arms of the Chair*



*Center, Right, Latest Electric Iron Has Its Own Stand That Permits Housewife to Leave Iron at Any Spot on the Board; Pushing a Button Swings Two Metal Rests under Iron to Make the Stand; No Heat Is Transmitted to the Rests; Another Touch of the Button Causes Rests to Spring Back into Place; Below, Left, Combination Ironing Board and Step Ladder with Basket Holder and Sleeve Board Attachments; the Device Is Collapsible for Easy Storage When Not in Use; It Is Capable of Supporting Unusual Weight*



*Bottom, Right, Lingerie and Clothes Drier May Be Hung from Top of Door, on Window Ledge, on Door Knob, on Chair Back and Other Handy Places*





# CONVENIENCES HOME



Above, Steam Cooker Steams Three Vegetables at the Same Time without Mixing the Flavors; It Cooks at Half the Gas Pressure Used in Boiling; Circle, Right, Rubber Grip for the Bathtub Is Held in Place by Suction Cups That Do Not Mar Tub Finish; Metal Plate Molded into the Grip Makes It Possible to Shape It to Contours of Tub Rim; Below, Coffee Maker Whirls Grounds through Hot Water at High Speed When Motor Is Turned on; Automatic Timer Sets Motor for One to Four Minutes

Below, Handy Beverage Wagon May Be Folded After Using and Placed in Closet or behind Door; the Two Trays Can Be Removed and Used Separately; the Wagon Is Heat and Alcohol Resistant



Below, Wooden Laundry Tongs Save the Hands on Wash Day; Insulated against Heat, They Are Used to Lift Clothes from Boiler or Rinse Water and to Feed Them into Wringer





*Suggest pocket size reflex receiver*  
*International Radio Corp*  
*Ann Arbor*



Radio Set for the Man on Foot; the Receiver and Batteries Are Attached to the Belt

### RADIO SET FOR PEDESTRIANS IS ATTACHED TO BELT

Pedestrians can now enjoy radio programs as they walk by using a small radio receiver which weighs only three and one-half pounds and which can be worn under the clothing. The loud speaker rests in a breast pocket and is fed by wires leading from the receiving set attached to the belt. Power is supplied by batteries strung along the belt. The set is suitable for motorcycle or mounted officers and for the policeman walking a beat.

### VACUUM TURBINE TO MAKE ICE BY USING WARM SEA WATER

Differences between the temperatures of surface water and water from the depths of tropical seas will be utilized in a vacuum turbine designed to produce ice. In the laboratory, a small model of the turbine works perfectly. Water fills half of the system and a small reservoir or boiler. Air in the upper part is exhausted to as great a vacuum as practical. The upper coils are cooled by a wrapping of wicks

that dip into water, the evaporation acting as a cooling system. Holding the hand on the reservoir starts the system, the water beginning to "boil" quickly on account of the vacuum. This "steam" passes through a nozzle, actuates a small turbine, and exhausts into the cooler tubes where it is condensed to fall back into the system, ready for the process to be repeated. The condensation maintains the vacuum. The entire system is inclosed. A similar plant, many times larger, has been mounted on a ship for operation in tropical seas, where surface water frequently is thirty degrees warmer than that from the depths. By making use of this difference in temperature, Georges Claude, the inventor, hopes to make ice in his vacuum turbine. The surface water will be made to boil in a partial vacuum, with cold water from the depths acting as a condensing agent.

*see page 12*



Temperature Turbine of Glass Is Entirely Inclosed; Heat of Hand Starts It Operating

Whenever you find that you wish to know more about any article in this magazine, write our Bureau of Information, inclosing return postage.

*in Franklin Museum*  
*Philadelphia*

*D1209*  
*Long address unknown.*  
*at Chicago Radio and Electrical Engineering*  
*by procedure*

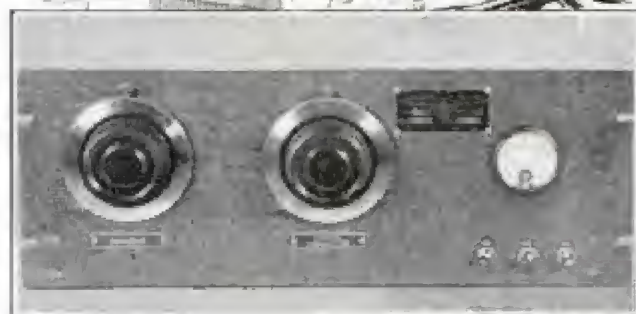
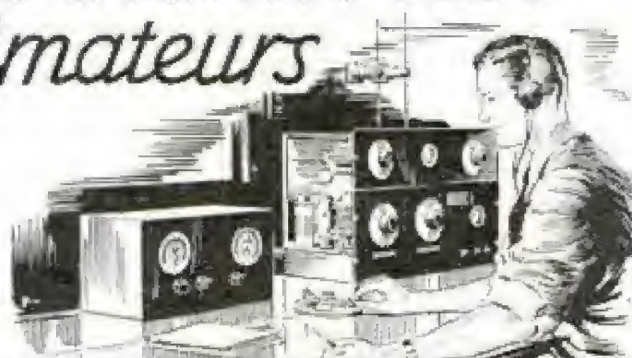
*see American Camera Club*  
*Chicago 117 West 11th Street*





# COMPLETE TRANSMITTER... *for Beginning Amateurs*

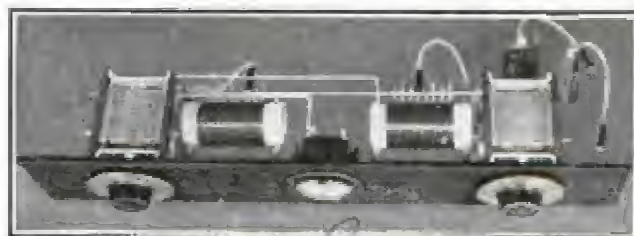
THE newcomer joining the rapidly increasing ranks of amateur radio operators is no longer handicapped by a lack of efficient and inexpensive apparatus. This compact c.w. or "key" transmitter enables the amateur to start out with a minimum investment and yet have an instrument that will deliver a high quality c.w. signal which meets all government requirements. It will also serve as a stand-by transmitter in a higher-powered amateur station to be used when full power is not required. Starting with this well-designed unit, the beginner can build or purchase additional



equipment as desired. The measured output of the transmitter is 28 watts on 3,500 and 1,700 kilocycles, 25 watts on 7,000 kilocycles, 13.2 watts on 14,000 kilocycles. It is crystal controlled, employing a type-47 tube for the oscillator and parallel 46's in the power amplifier. Interchangeable coils are provided for the various bands and the power amplifier is operated on the crystal frequency in each case.

A separate power supply is used for the oscillator to reduce frequency "chirp" and a meter is provided with a switching arrangement to read plate and grid currents. Complete instructions and tuning charts are supplied. The instrument is self-contained, as shown in the photos, and plugs directly into a 110-volt, 60-cycle outlet. A telegraph key is connected to two insulated leads, brought out from the chassis, and the usual single-wire Hertz, or a Zeppelin-type, antenna may be employed.

(Continued to page 118A)



*Collins Radio Co.  
Rapid, Rapido, d'oua*



## A black and white photograph of a vintage electronic device, possibly a radio or amplifier, with its front panel removed, revealing internal components like vacuum tubes and capacitors. The device is resting on a surface covered with a colorful, striped, fringed textile. A small vase with flowers is visible in the background.

Because of its compact size and light weight, it may be installed in cabinets of unusual design, two of which appear in the photos. An inexpensive type is shown at upper left; the inside dimensions are 5 by 6 $\frac{3}{4}$  by 9 $\frac{1}{4}$  in. A more elaborate va-



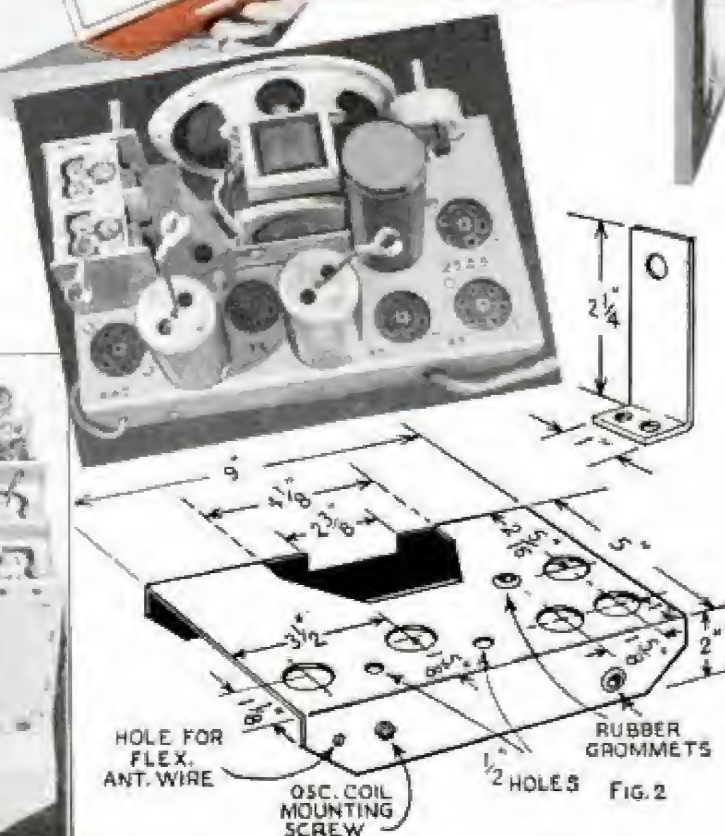


# FIVE-TUBE SUPER OR D.C.

riety at upper right represents a group of seven books, the case is made of wood covered with morocco leather, hand tooled in gold leaf. A 25-ft. spool of flexible insulated antenna wire is permanently fastened to the set.

All of the actual wiring is clearly shown in Fig. 1, as viewed from the underside of the base. The various parts are in their approximate positions; however, they are spread out to simplify the wiring diagram. Sectional diagrams of the intermediate-frequency transformers and ganged-condenser unit, mounted on top of the base, are also included in detail. The base is formed from a single metal sheet and the dimensions are given in Fig. 2. A cut-out section is required for the speaker, which is mounted directly on the base. A completely formed and drilled base is available if desired. The bracket de-

(Continued to page 118A)





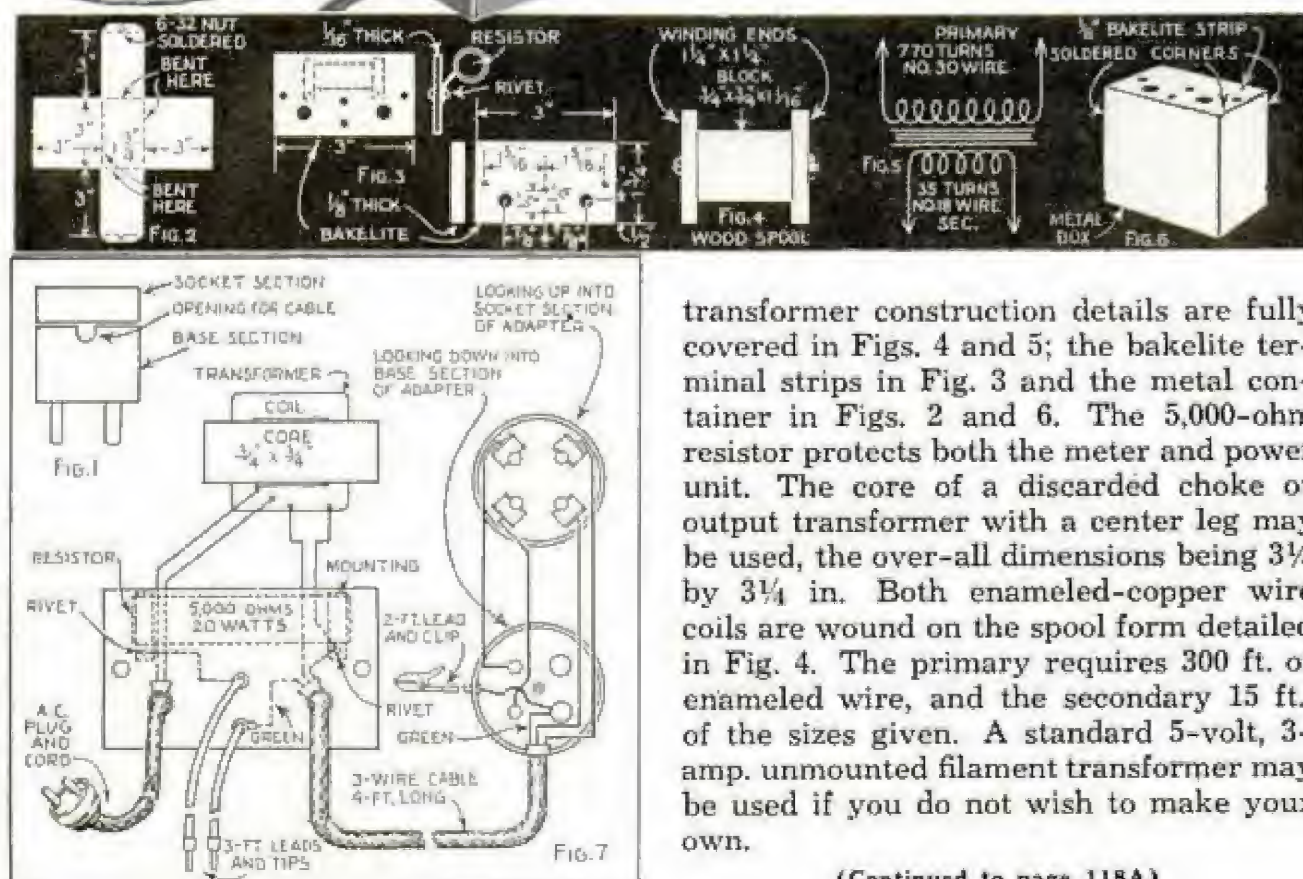
# Homemade Trouble Locator for Power Units

By S. H. BURNS



RADIO service men and experimenters will find this simple low-cost device a valuable addition to their testing equipment. The regular set tester shows just what is taking place in each tube circuit, with the exception of the rectifier. If a bad condenser or an open choke in the power-supply circuit is suspected, it has been necessary to remove the chassis and break the connection between the rectifier filament and the choke-condenser system before checking.

This device, in conjunction with the set tester or a single meter, enables the service man to locate the trouble immediately. It consists of a homemade filament transformer wired to a 4-prong adapter, which is assembled from a 4-prong tube base and a Na-ald adapter-socket section. The adapter assembly is shown in Fig. 1. All connections between the base and adapter-socket sections are clearly shown in Fig. 7. The filament terminals of the socket section are connected to the cable leads that go through the bakelite strip to the secondary of the filament transformer. The



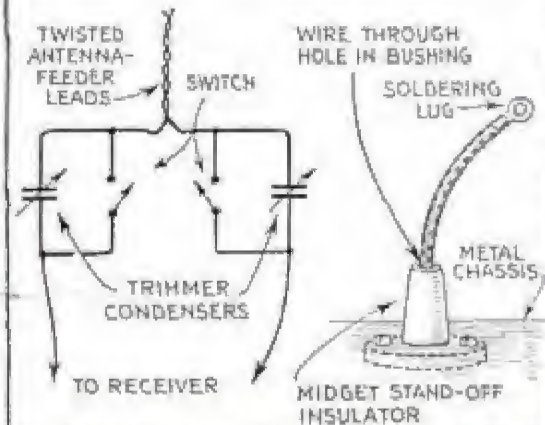
transformer construction details are fully covered in Figs. 4 and 5; the bakelite terminal strips in Fig. 3 and the metal container in Figs. 2 and 6. The 5,000-ohm resistor protects both the meter and power unit. The core of a discarded choke or output transformer with a center leg may be used, the over-all dimensions being  $3\frac{1}{4}$  by  $3\frac{1}{4}$  in. Both enameled-copper wire coils are wound on the spool form detailed in Fig. 4. The primary requires 300 ft. of enameled wire, and the secondary 15 ft., of the sizes given. A standard 5-volt, 3-amp. unmounted filament transformer may be used if you do not wish to make your own.

(Continued to page 118A)

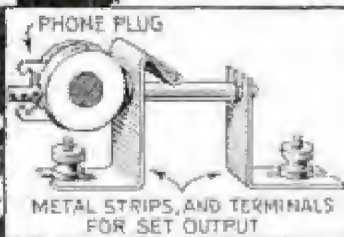


# PRACTICAL Radio Suggestions

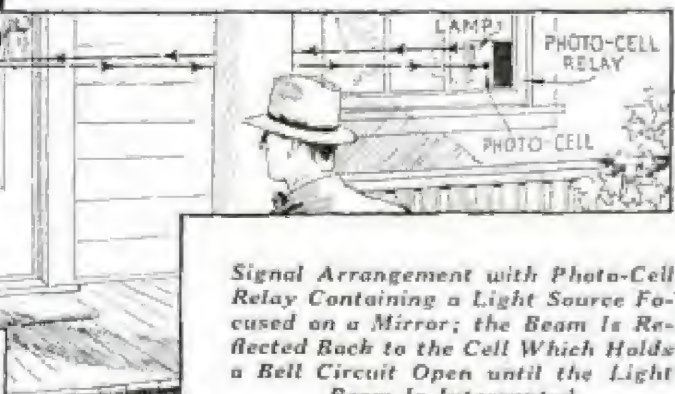
Below, Simple Hook-Up for Tuning Short-Wave Doublet Antenna to Increase Signal Strength of Distant Stations; the Variable Condensers Are 3-Plate Midgets; Right, Midget Stand-Off Insulator Makes Good Insulating Bushing for Bringing High-Voltage Leads through Metal Chassis



Above, Inexpensive Condenser Analyzer Tests Paper, Mica and Oil-Dielectric Types; Checks Open, Short, Leaky and Intermittent Condensers; Leakage Is Indicated by a Neon-Glow Tube; Below, Sketch at Left Shows Handy External Phone-Plug Mounting Made of Spring Brass; Right, Old Tube Base Makes Sturdy Plug-In Connector for Battery Cable to Terminal Socket; Cable Is Inserted through Hole Drilled in Side of Base; the End Is Closed with Sealing Wax



Left, Low-Cost Combination Hand Set, for 5-Meter Phone Transceiver, Consists of a 2,000-Ohm Head Phone Mounted on an Insulated Handle, the Other End of Which Carries a High-Output Microphone; Total Weight Is Only 5 Ounces



Signal Arrangement with Photo-Cell Relay Containing a Light Source Focused on a Mirror; the Beam Is Reflected Back to the Cell Which Holds a Bell Circuit Open until the Light Beam Is Interrupted

D 4633  
 D 4634  
 D 4644  
 Universal Microphone  
 Condenser analyzer  
 Co. - Scientician  
 Jope - Conton - more  
 Inglenwood Calif





VACUUM CLEANERS



FOR CAMPERS



PUBLIC ADDRESS



FARM RADIO



SOUND TRUCK

110 VOLTS, A.C.  
FROM AUTOMOBILE  
BATTERY—  
32-V. FARM PLANT  
OR 110-VOLT D.C. LINE

type-25Z5 rectifying tube and is provided with a rugged base and baffle. The cone is 10 in. in diameter and the voice-coil impedance is 10 ohms at 400 cycles. A standard voice-coil transformer of 4,000 ohms, or any special transformer, is supplied at no additional cost. This speaker operates on 110-volts, 50-60 cycle a.c. current; however, other voltages are available.

*D4645*

### Tube Resembles Acorn in Size and Shape

Amateurs and experimenters in ultra-high frequency reception and transmission, in the 2½-meter and lower wavelength bands, no longer lack the proper type of tube for these microwaves. The Amateur Radio Division of the RCA

Radiotron company have made these tubes available; they offer an attractive field for experimenters who wish to explore the possibilities of these extremely short waves. Because of its minute size, the



Above, Miniature Tube Showing Clip Leads through Glass Envelope; Below, Compared with an Acorn

### Low-Cost Unit Supplies 110-Volts A.C. Anywhere

Available in three types, this compact, inexpensive unit produces regular 110-volt alternating current from 6-volt storage batteries, 32-volt farm plants and 110-volt d.c. systems. There are no rotating parts and the only element that moves is a vibrator which plugs in just like a radio tube. It will operate standard a.c. receivers in the home, midget sets in autos, vacuum cleaners and other a.c. appliances wherever a 110-volt a.c. supply is lacking.

### Speaker Is Designed for Efficient Short-Wave Reception

Low hum level, and unusual sensitivity to voice frequencies, are features of this self-powered dynamic speaker specially designed for short-wave work. It employs a



acorn-type tube is especially suited for use in portable radio equipment where conservation of space is important.

*Wright - De Coster, Inc.  
2251 University Ave.  
St. Paul, Minn.*



# A Lighted WALL AQUARIUM..

By FLOYD M. MIX

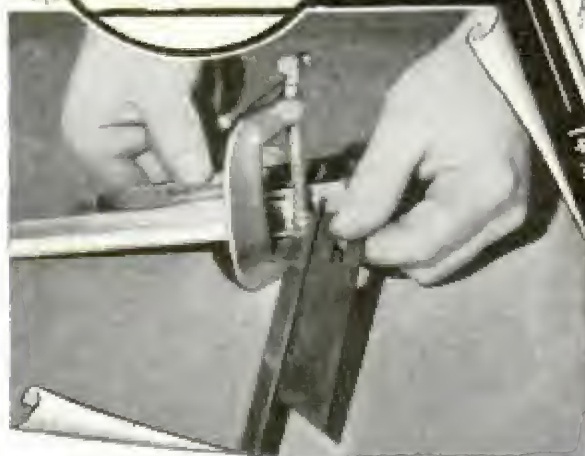
**H**ANGING on the wall like a picture, this aquarium is indirectly illuminated by a built-in light, which also serves as a heater for tropical fish. All sides are pieces of double-strength window glass cemented in an angle-brass frame and a colorful submarine picture on the back, which can be viewed from the front, through the aquarium, lends additional interest.

You will need about 15 ft. of  $\frac{1}{2}$  by  $\frac{1}{2}$  by  $\frac{1}{16}$ -in. angle brass and some No. 16-gauge sheet brass. Begin by cutting the angle brass to the various lengths shown in the drawings. Note the angles at the corners where the pieces are to fit together and saw them off so that they will fit flush. Accuracy of the corner angles can be tested with a bevel square as shown in one of the photos. Next, take the four vertical pieces of the frame and alter the angle of these pieces by squeezing them in a vise. The angles should be approximately  $70^\circ$  for the rear corners and  $110^\circ$  at the front corners.

In assembling, start by soldering the sheet-brass bottom to the bottom frame. C-clamps will hold the pieces of angle brass together while soldering. Solder the rear



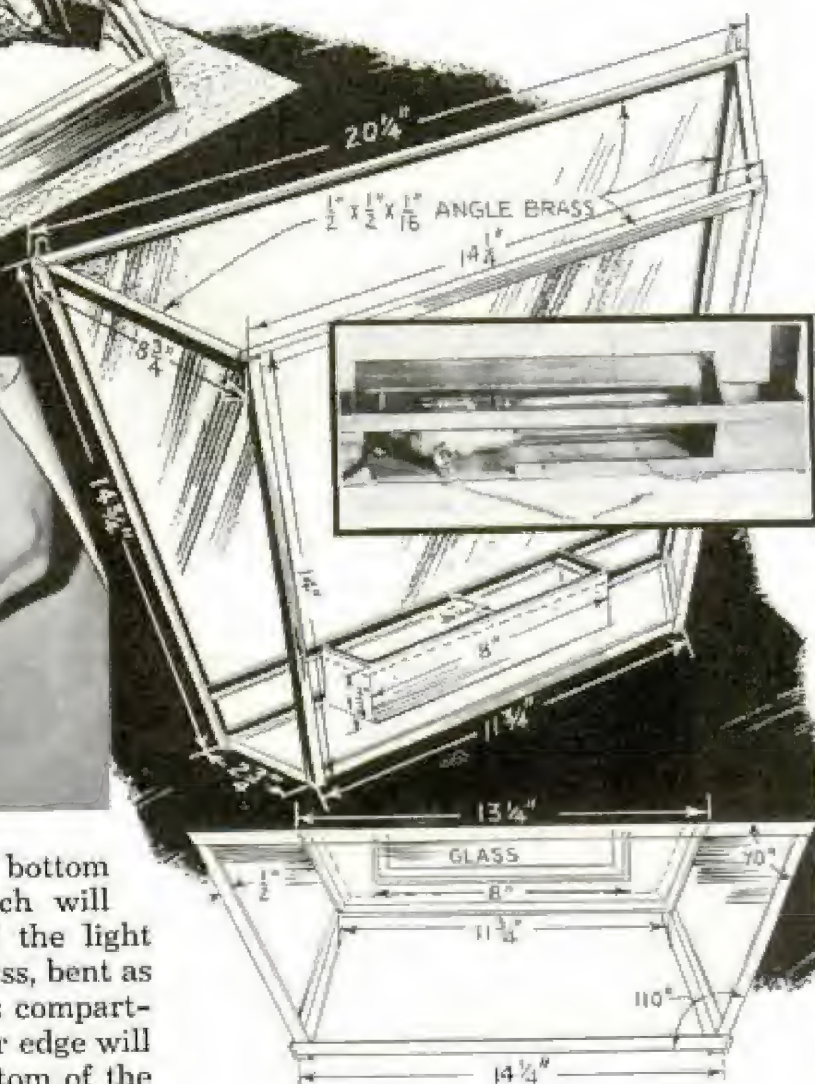




vertical frame members to the bottom frame; then a crosspiece, which will serve as the rear top piece of the light compartment. A strip of flat brass, bent as shown, forms three sides of this compartment. A narrow lip at the lower edge will facilitate soldering it to the bottom of the aquarium. The top part of the compartment is reinforced with pieces of angle brass, soldered in as shown, which also provides a ledge for a small piece of glass, to be cemented in later. The two front vertical pieces are soldered to the bottom frame, after which the top frame is added. All joints except one rear top corner, are soldered. Some of the top and bottom frame pieces must be spread apart their

entire length to get a snug fit at the corner joints. A small angle bracket is bolted to the bottom of the light compartment to hold a socket. The rear bottom frame member is cut away to insert the socket.

You are now ready to insert the glass. To determine the exact shape and size of the pieces, cut cardboard patterns that will project  $\frac{1}{4}$  in. over the inside edge of the frame members. Then cut the glass accordingly and fasten it in place with aquarium cement. As one top corner of the frame was not soldered, the insertion of the rear glass is easy, but would be im-



possible, however, if this joint had been soldered. Therefore it must be done after the glass has been inserted. In doing so, avoid getting the glass too hot, or it may crack. A green bronze on the brass portions has been found effective. Two wire hooks soldered to the rear top frame hold the aquarium on the wall and a 25-watt show-case bulb is inserted in the socket.



# Novelty Windmill Serves as Twine Holder

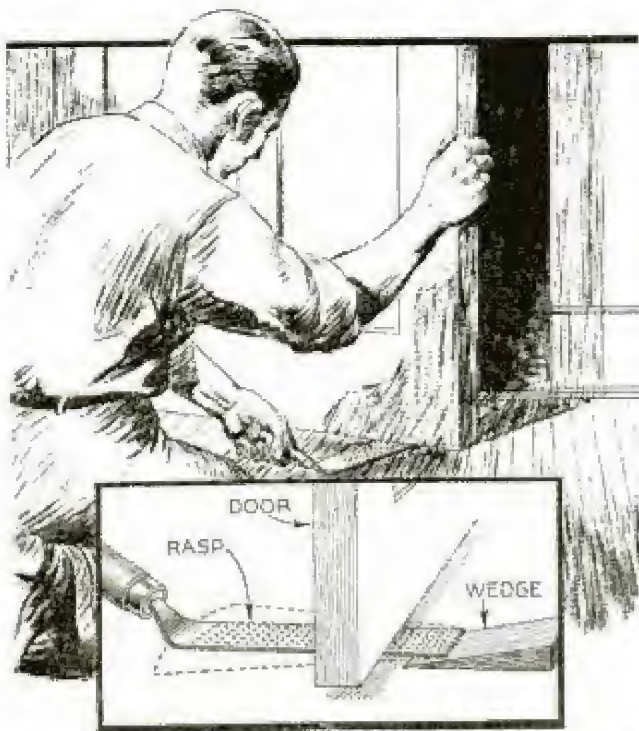


Conveniently hung on the wall, this ornamental Dutch windmill serves as a twine holder and also carries a memo pad. The twine is wrapped around a pulley on the shaft a couple of times and is then threaded through a hole in the side, so that pulling the twine out will cause the sails to turn. To make one, get a cigar box, strengthen the corners with brads and then attach a wood block, which holds a small memo pad, to the lower corner of the lid as indicated in the upper left-hand detail. There is room in the box for small balls of twine, while larger ones are accommodated by cutting a hole in the lid and recessing the back of the block. The body of the mill is shaped from a  $\frac{3}{4}$ -in. white-pine block, the sides being sloped and the dome rounded. The platform is a wood strip nailed on separately. After the block has been carved to shape, it is attached to the cigar-box lid and then the entire surface is given a coat of gesso or plastic paint. While this is still soft, the details such as clouds and grass of the background, and the window and the railing effects of the

mill may be worked in. When dry, the surface is painted to suit. Thin brass or tin sails are soldered to a cross, which is in turn soldered to a shaft. This may be a nail. The pulley, shown in the lower right-hand detail, also serves to keep the shaft in place.

☞The first time a can of glue is opened, wash the glue from the cap and top of the can and apply a little vaseline to them to prevent the cap from sticking the next time the can is opened.





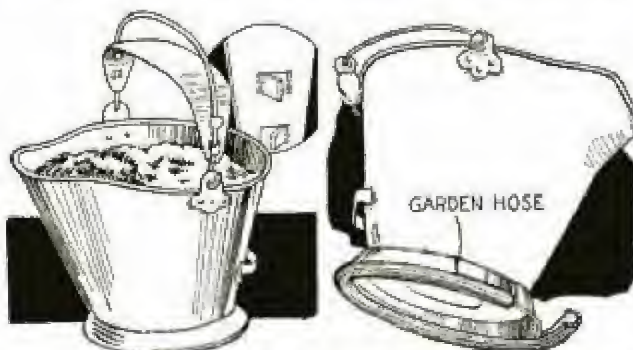
*Rasp Used with Wedge for Planing Off Portion of Door to Prevent Binding*

### Rasp and Wedge Repair Sticking Door

Often, when a door sticks at the bottom, the trouble is confined to a small space that can be planed down with a wood rasp without removing the door. First heat the rasp tang and bend it upward as shown, after which the rasp is inserted under the door and a wooden wedge is slipped under one end to hold it parallel with the surface to be planed. Then by moving the rasp back and forth as indicated by the dotted lines, enough wood can be removed to cure the trouble.

### Improving Your Coal Hod

When a coal hod is used for carrying hot ashes, a sheet-metal shield slipped over the bail will deflect the heat away from the hand. Small tabs cut in the metal as shown in the left-hand drawing, are

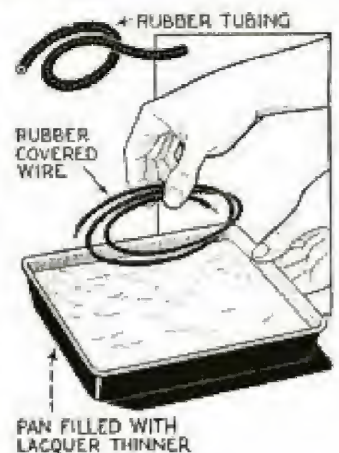


*Hose Prevents Coal Hod Marring Floors, and Shield on Bail Protects Hand from Hot Ashes*

bent around the bail to hold the shield in place. The right-hand detail shows a length of old garden hose around the bottom of a hod to prevent it from marring the floor. The hose is slit along one side and then slipped over the edge of the base where it will stay without fastening.

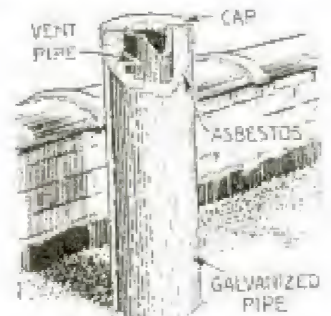
### Rubber Insulation Removed from Wire with Lacquer Thinner

To quickly remove rubber insulation from wire roll up the latter and put it in a shallow pan containing some lacquer thinner. After soaking the insulation from a few minutes to an hour, as necessary, you will find that it can be pulled off the wire with ease, as the lacquer thinner causes the rubber to swell. If the insulation is put away to dry, it will serve nicely as rubber tubing of small diameter.



### Asbestos Insulation Prevents Vapor from Freezing in Vent Pipe

To prevent vapor from freezing and clogging the end of a vent pipe in winter, the portion of the pipe projecting above the roof may be insulated. This can be done by slipping a large galvanized pipe over the vent and then filling the space between the two pipes with asbestos wool. For best results, the galvanized pipe should be large enough in diameter to provide a 2-in. space between it and the vent pipe. A galvanized cap having flanged edges and a hole in the center of the same diameter as the inside diameter of the vent pipe, should be placed over the top of the assembly to protect the asbestos against rain.—George H. Valiquette, Ottawa, Ont., Can.



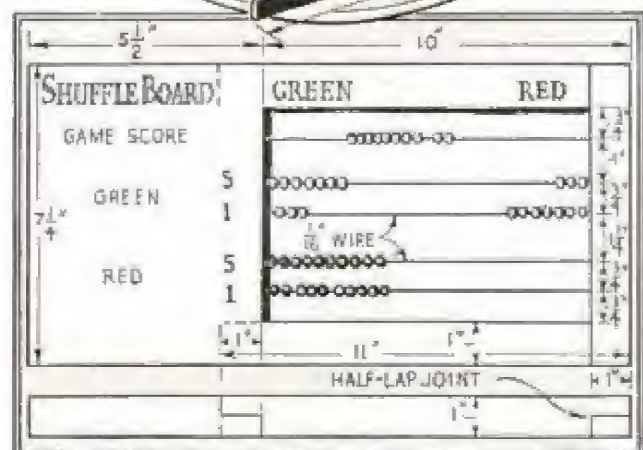
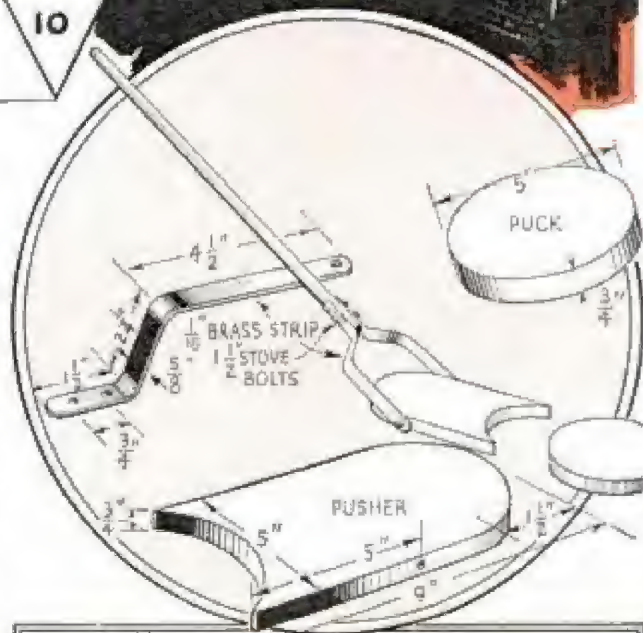
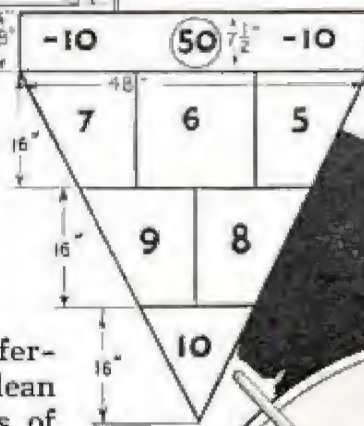


# SHUFFLEBOARD COURT

## *for the Basement Game Room*



**L**AID out on the floor of your basement, a shuffleboard court provides a competitive game that requires skill. The width of the court should be 4 ft., while the length can be varied according to the floor space available, at least 25 ft. being preferable. First mark off the court, clean the concrete and apply two coats of dark, gray paint. Then mark out the end zones and paint the scoring divisions. Two coats of spar varnish followed by a thorough polishing with powdered wax will give the court a smooth, polished surface. The equipment for the game consists of eight hardwood pucks and two pushers, made as shown in the circular detail. For a scoreboard, purchase a child's counting frame in a dime store, remove the wire and beads and assemble them on a board as shown in the lower detail. To play the game, all the pucks are pushed from one end of the court to the other in an effort to get them wholly within one of the scoring divisions. A puck may be touching one of the dividing lines provided its edge does not extend over the center of the line. Fifty points make a game. Besides the scoring divisions, there is a division of minus 10, which is a penalty. For two players, each one pushes the pucks first from one end and then the other, the players alternately shooting one puck at a time. When four play, partners remain at opposite ends of the court, the opponents alternately shooting one puck at a time.







*Controlling Drill-Press Spindle by Foot When Routing Leaves Both Hands Free to Guide the Work*

### Foot Control for Routing with Drill Press

Leaving both hands free to guide the work when routing with a drill press, this foot-operated attachment makes it possible to do the job more accurately than when one hand is used to operate the drill-press spindle. As shown in the photos, the attachment consists of two wood blocks hinged together at one end with a compression spring between them. To a screw eye in the upper block is attached a strong cord or wire, which in turn is fastened to one end of the drill-press arm. For drill presses that have no spring to raise the spindle when it is released, a small coil spring or a strip of rubber can be attached to the free end of the arm and to the frame to raise the spindle.

¶Two or three drops of 10-per-cent aluminum-sulphate solution added to a small bottle of mucilage will increase its adhesive qualities.

### Solution to Prevent Photographs from Curling in Cold Weather

To prevent photographic prints from curling in cold, dry weather, brush over the back of the paper a solution consisting of table gelatine 1 oz., and water, 10 oz. After the prints have been brushed with the solution, place them under some heavy books or other weights to flatten out.

### Shoes Cleaned with Cuticle Remover

Ordinary cuticle remover has been found an effective cleaner for removing spots on white kid shoes.

Just moisten a clean cloth with cuticle remover, rub the moistened part over the soiled spot, and see how quickly it will disappear. This is especially handy if your shoes get spotted when away from home where a cleaning fluid is not at hand.



### Hose on Teakettle Aids in Watering Caged Pets

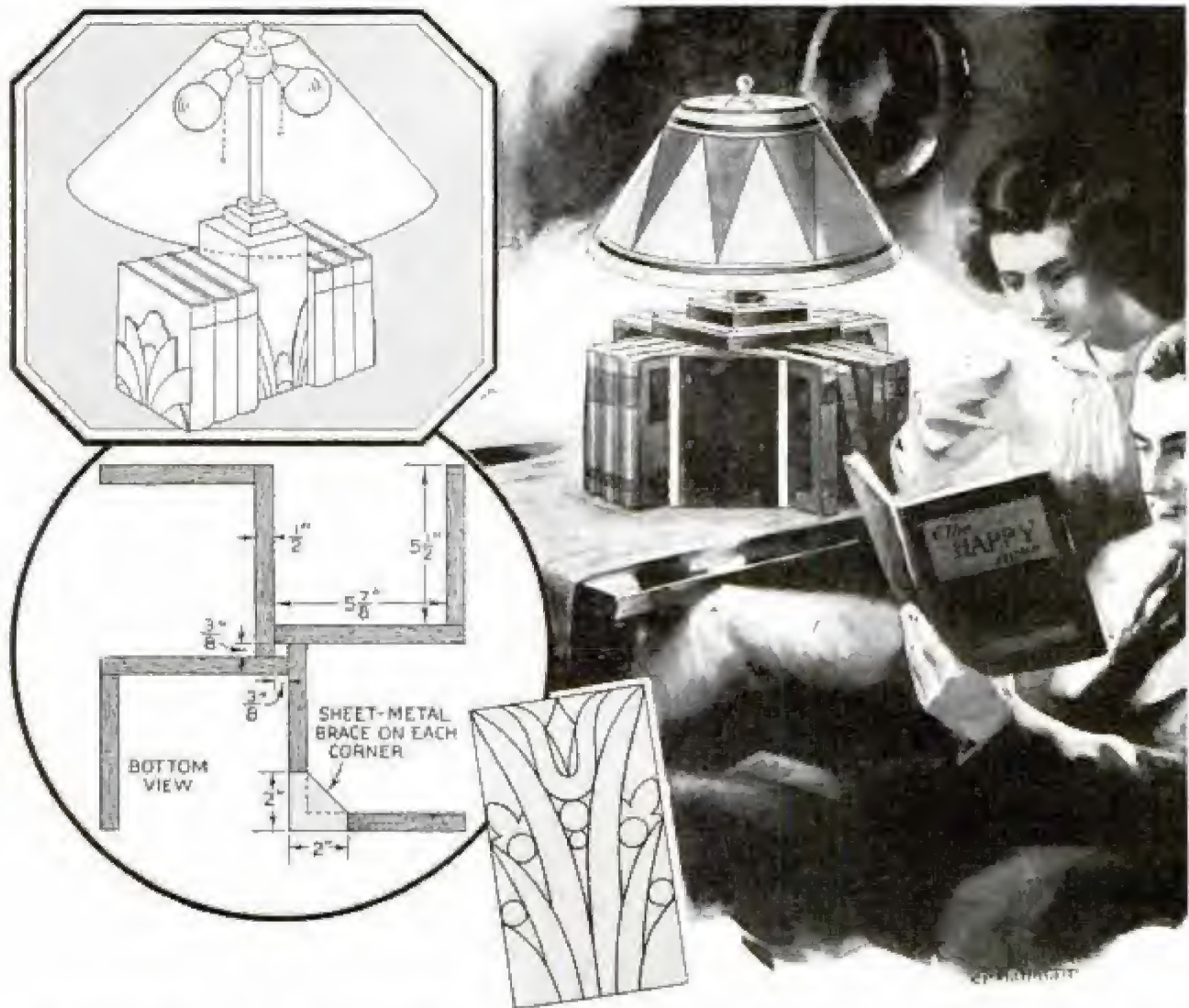
Difficulty often experienced in filling water containers inside of cages or pens is overcome readily by slipping a length of garden hose over the spout of an old teakettle and using it as shown. The hose can be slipped through the wire mesh of the cage and the water poured into a container without spilling.



*Length of Garden Hose on an Old Teakettle Spout Provides Handy Container for Watering Pets*



# Combining Book Racks with Table Lamps



A combined table lamp and book rack is an attractive piece of furniture that readily lends itself to many variations of designs. The one on the table consists of a solid or hollow block 5 in. square with triangular book ends at the corners. The book ends are glued up of contrasting woods, and, for decorative effects, the exposed faces may be carved, scroll-sawed, painted or left plain. After squaring the ends of the block, cap the upper end with a square piece large enough to overlap the tops of the book ends, to which it is nailed or screwed. For appearance, a smaller block is nailed to the cap, after which both are drilled to take the lamp standard. To hold the assembly together, a square piece of aluminum or brass is screwed to the bottoms of the center block and the book ends. The underside of this is covered with felt to prevent scratching the table

top. The lamp shown in the upper left-hand detail has a square center block, similar to the one just described, and the block is mounted on a base to which the book ends are also screwed. In making the lamp shown in the lower detail, use well-seasoned stock and glue and screw the parts together, bracing the joints on the bottom with sheet metal. In assembling the parts, leave a hole in the center for the lamp standard as indicated.

## Giving Copper Articles a Black Color

Copper articles may be colored a deep black by first cleaning them and then applying a saturated solution of copper nitrate, after which they are heated to bring out the color. A sodium-sulphide solution will produce a rich, mulberry color, which will blacken with repeated applications.





*When Duplicate Forms Are Needed, Cardboard Spacing Strips Help to Do the Ruling Quickly*

### Cardboard Strips Aid in Ruling Special Forms

To save time in ruling a number of duplicate forms, several cardboard strips were spaced on a drawing board to get the desired vertical lines and then fastened at the ends with thumb tacks so that sheets of paper could be slipped under them from one side. Spacing marks for the horizontal lines were made next on each strip, after which the ruling was done with speed.

### Sealing Ash-Pit Door to Use Blower on Furnace

If you have a blower on your furnace to aid in burning buckwheat coal and find

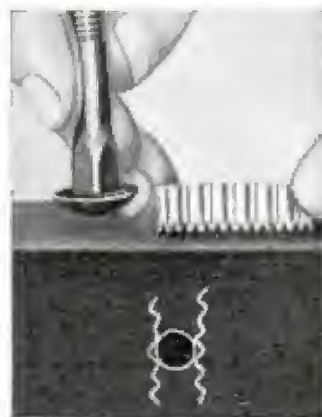


*Felt Applied to Edge of Ash-Pit Door Prevents Loss of Draft When Using Blower on Furnace*

that there is a loss of draft by air leaking around the ash-pit door, the application of felt strips around the opening as indicated will end the trouble. Water glass provides a good adhesive for sticking the felt strips to the metal around the door opening.

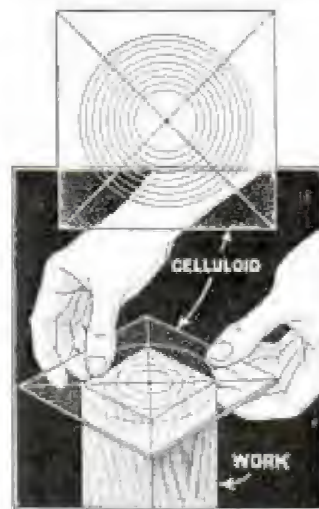
### Corrugated Fasteners Keep Bolts from Turning in Wood

When carriage bolts are used in wood, it often decays around the hole and the bolt turns so that the nut cannot be loosened. To prevent this, drive a couple of corrugated fasteners into the wood on opposite sides of the hole before putting the bolt in place. It is best to drive the fasteners into the wood across the grain to avoid splitting the work.



### Celluloid Plate Centers Work for Wood Lathe

To center work for his woodturning lathe, one man uses the gauge shown. A square sheet of celluloid is drilled through the center and circles are scribed around this point with a scratch compass, after which diagonal lines are scratched from corner to corner. When placed on the work, it is easy to adjust the position of the circles for cylindrical work or the diagonal lines on square stock to indicate the center, which is then marked with a pencil. — G. E. Hendrickson, Argyle, Wis.

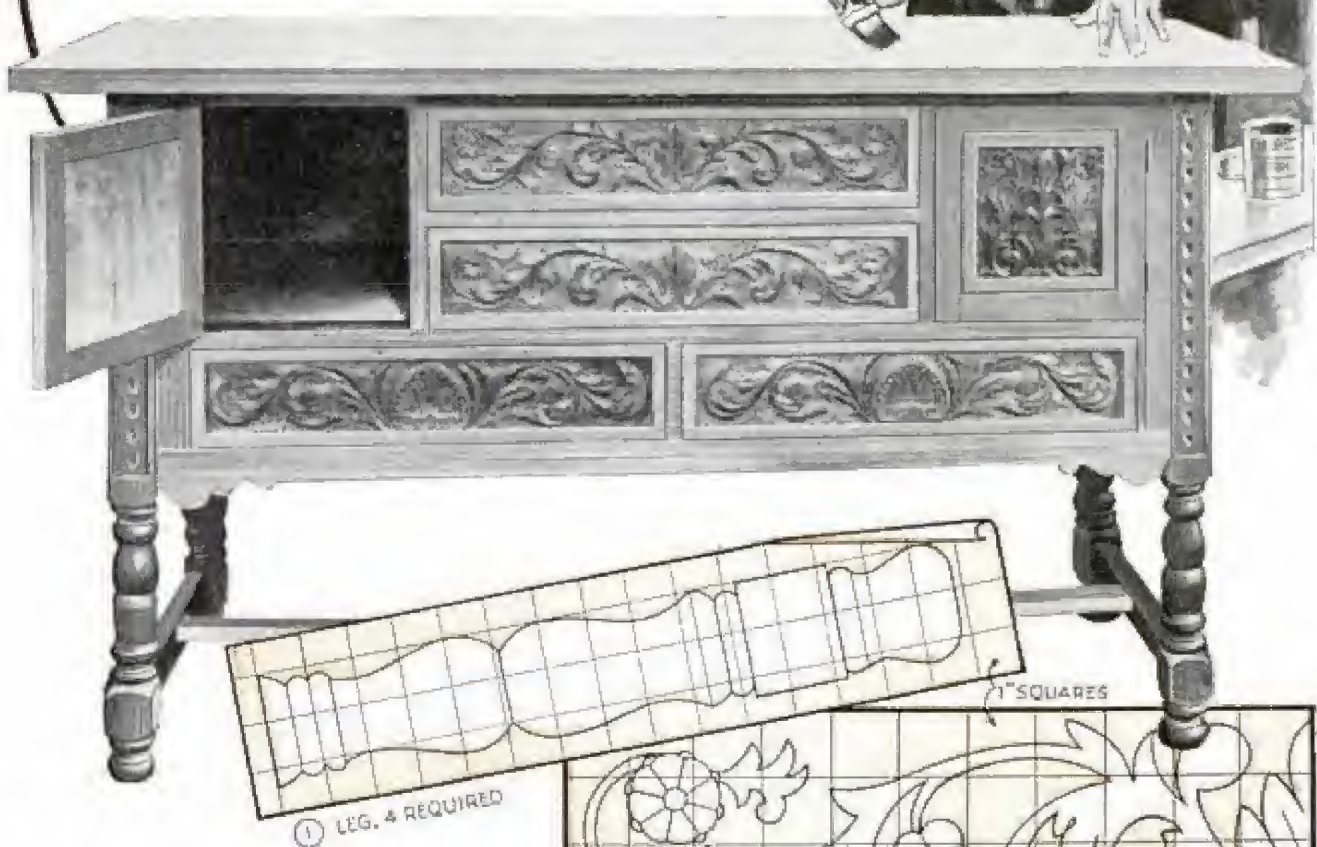


Unpainted garden or porch furniture made of oak or teak should be treated with linseed oil at intervals to preserve its color and prevent the wood from cracking.



no 03 8

# Hand-Carved *Mahogany* **BUFFET**

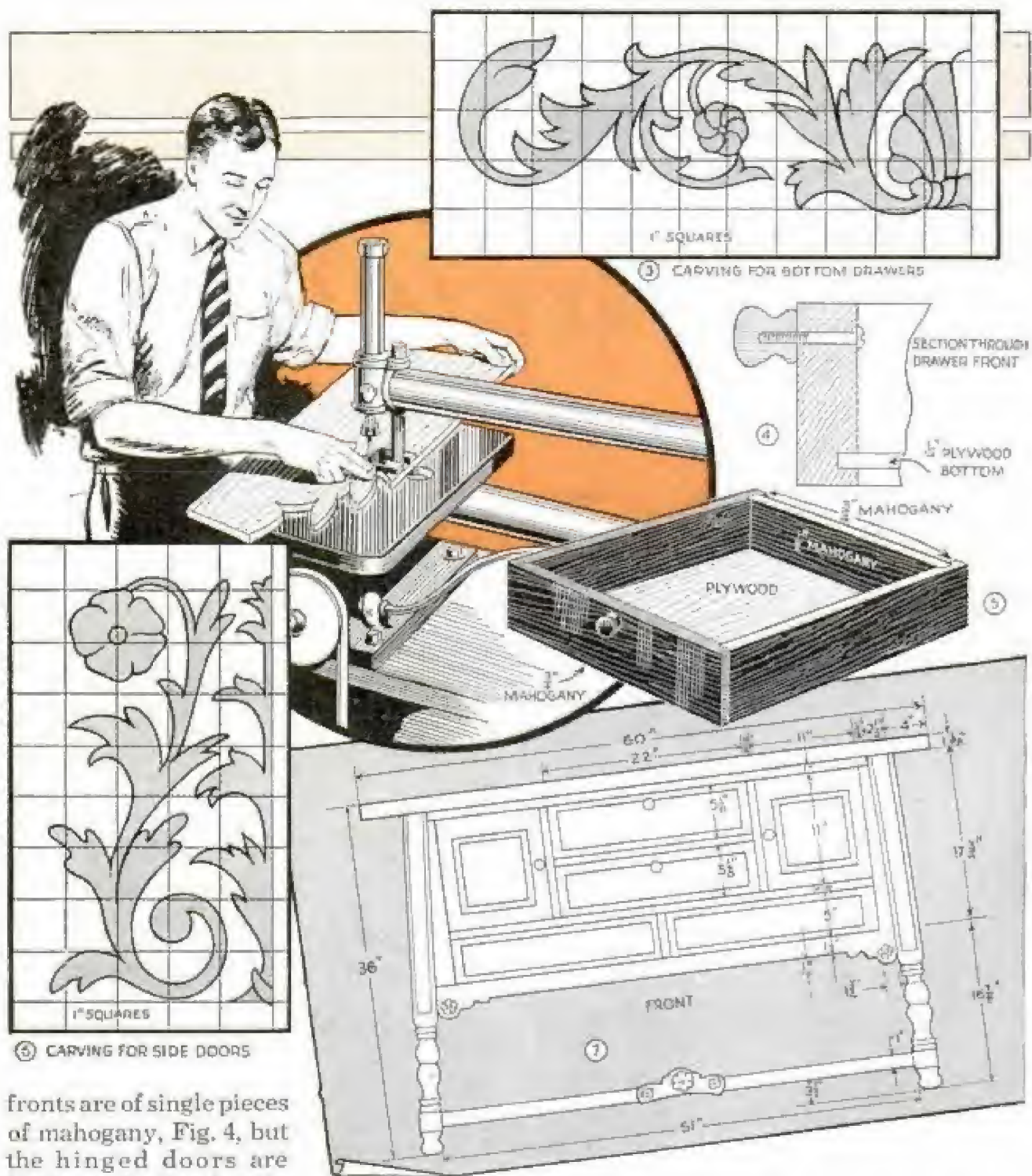


**T**HIS handsome example of a carved mahogany buffet comes within the scope of the average craftsman. The original, shown here, is one of several built by students of the John Muir Technical High School, Pasadena, Calif., and the young man who finished this particular job had no previous experience in wood carving.

Over-all dimensions are given in the front and end views, Fig. 7. The solid top is built up of mahogany planks doweled and glued together. Legs, Fig. 1, are turned from 2½-in. stock, and joined in pairs with a ¾-in. panel at the top and a 1¼-in. cross piece at the bottom. The two

pairs of legs are then joined by framing as in Fig. 8. The front of this framing, which serves as divisions between doors and drawers, is ¾ by 2 in., with the exception of the top member, which is 1 in. thick. For the hidden part of the framing, pine is used. The partitions are mortised into top and bottom frame members. The bottom drawers slide on guides, while the central drawers are supported on rails forming part of the framing. Drawer



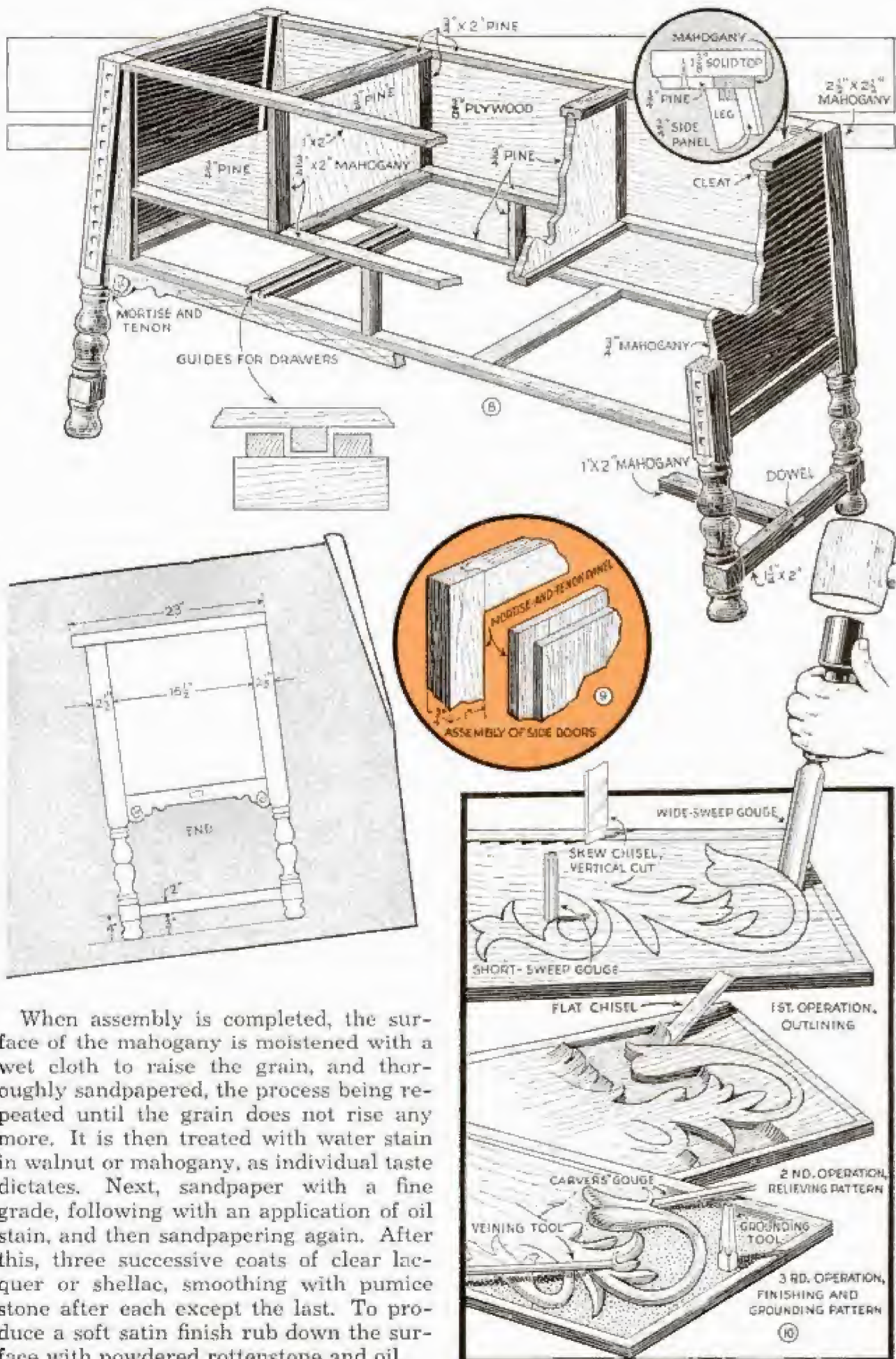


fronts are of single pieces of mahogany, Fig. 4, but the hinged doors are built up of a panel mortised into a frame as in Fig. 9. The perspective of the drawer, Fig. 5, shows the method of assembly. The solid top is held securely on the frame by driving screws up through the latter, all screw heads being well countersunk.

Figs. 2, 3, and 6 show carving designs for the drawers and doors. All pieces should be carved before assembly, so that they can be held in a vise or clamp. Sketch the patterns on heavy paper and transfer directly to the wood by tracing the design over carbon paper. Then outline the pat-

tern as shown in the first operation, Fig. 10, using the skew chisel on all straight cuts and gouges of suitable sweep for the curved parts of the pattern. Relieve the pattern with a straight chisel to chip out the waste to a uniform depth. The ground is worked over with a carver's grounding tool moved irregularly over the surface and tapped lightly with a wooden mallet. In case you wish to avoid the work of carving, it may be imitated with scroll-sawed overlays of 1/4-in. matching plywood, fastened with glue and brads.







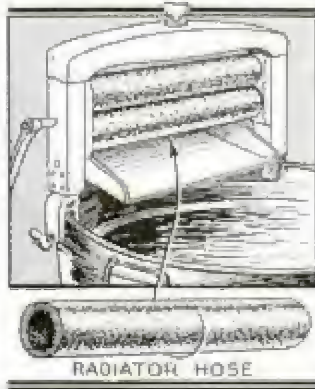


*Stylus Points for Mimeograph Stencil Work Made from Hairpins and Phonograph Needles*

### Homemade Stylus Points Fit Automatic Pencil

Stylus points for lettering or cutting designs on mimeograph stencils are made easily from phonograph needles and pieces of hairpins, and are conveniently held in an automatic pencil. The stylus shown at the top of the drawing is a phonograph needle and is used for tracing fine lines, a blunt needle being used for heavier work. The ruling stylus is made from a piece of hairpin and will not cut through the stencil, while the hook stylus is for tracing letters through a celluloid lettering guide. The stylus shown at the bottom is also made from a hairpin and is used in connection with a screen for shading.

### Rollers on Clothes Wringer Renewed with Radiator Hose



hose. Coat the rollers and the inside of the hose with rubber cement and slip the

When the rubber covering on your wringer rollers becomes pitted or worn, do not throw them away. Instead, smooth up the rubber with a sharp knife and then cover the rollers with lengths of radiator

hose over the rollers before the cement starts to dry. There are several types of radiator hose, and, in selecting it, get the kind that has fairly thick walls of live rubber. Avoid the type that is reinforced with steel wires as the latter make the hose stiff.—N. J. Denman, Flint, Mich.

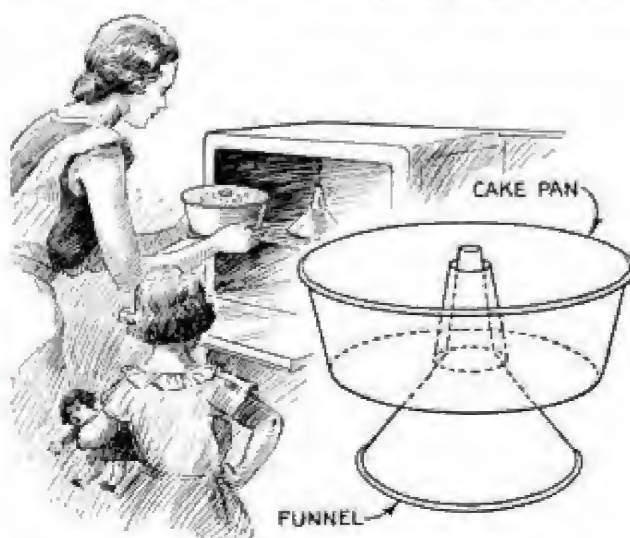
### Holder for Small Paint Cans

To prevent paint that runs down the sides of the can from soiling the hands or dropping onto the work or floor, use this holder. It is made by cutting away the upper part of a tin can as indicated by the dotted lines, to leave a projection, which is then bent over to provide a handle.



### Large Funnel Helps When Baking Angel-Food Cake

In order to get a uniform temperature on all sides of a pan in which an angel-food cake is baked, and to help absorb shocks that might cause the cake to "fall," one woman recommends the use of a large tin funnel. The latter is placed in the cen-



*Pan Set on Funnel in Oven to Get Uniform Temperature When Baking Angel-Food Cake*

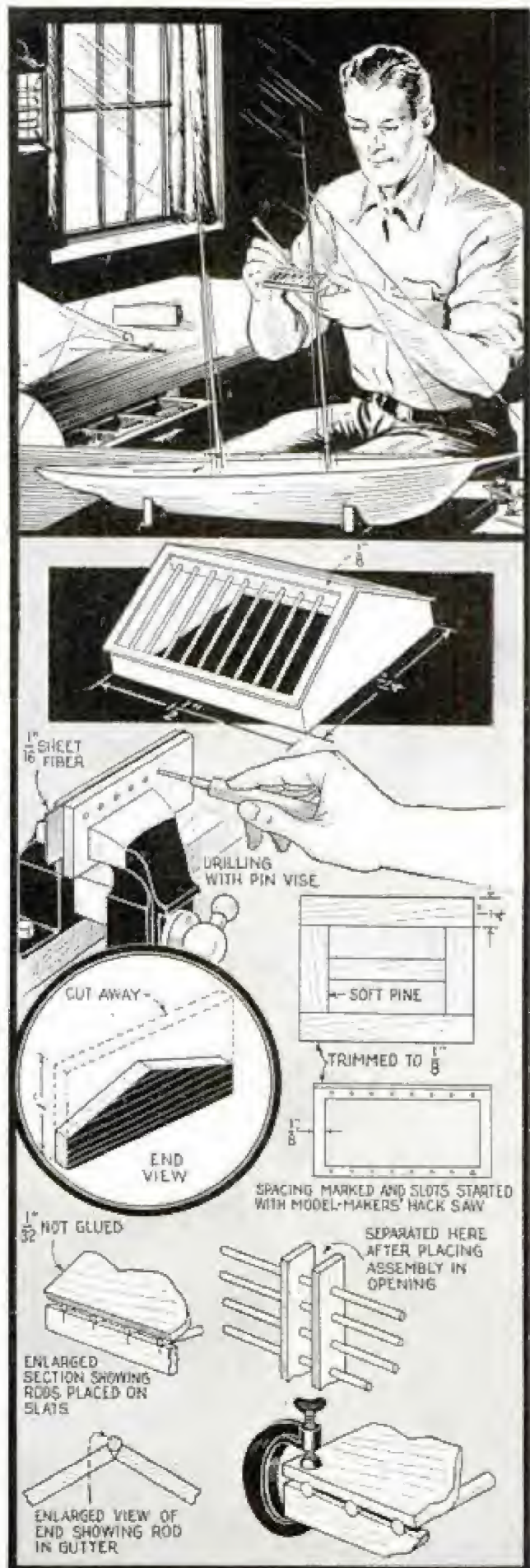
ter of the oven with the spout upward, after which the pan containing the cake batter is set over it as shown.—G. E. Hendrickson, Argyle, Wis.



# Model-Ship Grating Bars Alined Accurately

Accurate alinement of grating bars on ship-model hatches is one of the details that give your model the touch of fine workmanship. Such correctness of detail can be done with little added effort, although it will require care, patience and time. In the example illustrated, the overall size of the hatch was  $1\frac{1}{2}$  by  $1\frac{1}{4}$  in., and the trim was  $\frac{1}{8}$  in. The assembly is first made up of  $\frac{1}{4}$ -in. white pine, the parts being glued together. The circular insert shows how the ends are cut down at an angle to the center line. The height should be  $\frac{1}{2}$  in. less than the finished height to allow gluing a piece of this thickness over the top, after the grating notches are cut. The whole assembly is trimmed to  $\frac{1}{8}$  in. Next, the location of the bars is carefully marked and the notches cut with a model-makers' hack saw. The rods are cut from small wire paper clips and pressed into the notches. Then the top piece is laid on and a small clamp is applied as in the lower right-hand detail. This squeezing process imbeds the rods in the soft wood, making it unnecessary to cut slots in the top piece. Then the clamp is removed and glue is applied, after which the clamp is replaced, tightened and the assembly set away to dry. A small portion of the  $\frac{1}{2}$ -in. piece is allowed to hang over the edge. This is cut down with a sharp knife to simulate a hinged joint at the peak. A larger paper clip than those used for the grating bars, is straightened out and glued into place as shown in the lower left-hand detail. After sanding and scraping off excess glue, a coat of white paint is applied. A real trim job can be had by applying a coat of black paint to the cross bars and the hinge rod.

A second method of fitting grating bars is to use strips of  $\frac{1}{10}$ -in. sheet fiber. These are clamped together between two strips of wood, and holes to receive the grating bars are drilled. The bars are put through the strips while the latter are still together. Then the assembly is placed in the hatch opening and the fiber pieces pushed out to the sides. A touch of glue applied to the fiber strips will hold them securely to the edge of the opening and the grating bars will be in perfect alinement.—Kenneth Cloud, Chicago.



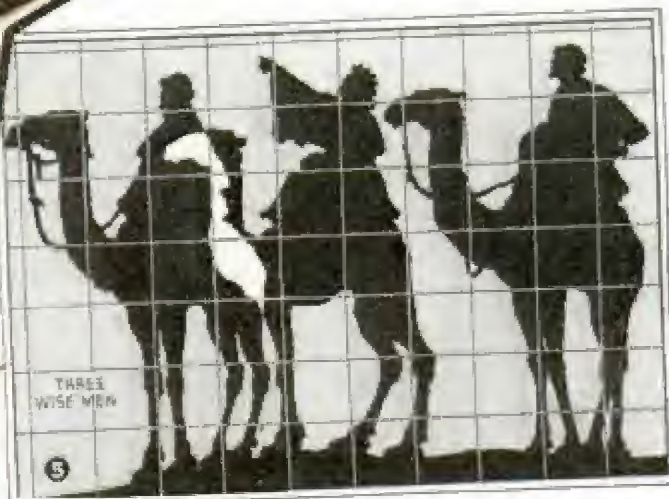




# DRESS UP FOR

Outdoor Christmas lighting can be applied effectively to any home, using simple arrangements of colored lights in festoons, stars and wreaths.

WITH the infinite variety of materials which can be purchased and made, Christmas decorating in light and color becomes a pleasurable task. Several fine examples of exterior lighting are shown in Figs. 1 to 4. In planning such a decorative treatment, it is best to work from a snapshot, dotting in the lights with colored ink. Work for a balanced and orderly effect; a few lights carefully placed are better than a multitude of lights strung in a haphazard manner. Notice the effective use of cut-out figures as detailed in Fig. 5. Window treatment is important—one or two windows carefully done will brighten



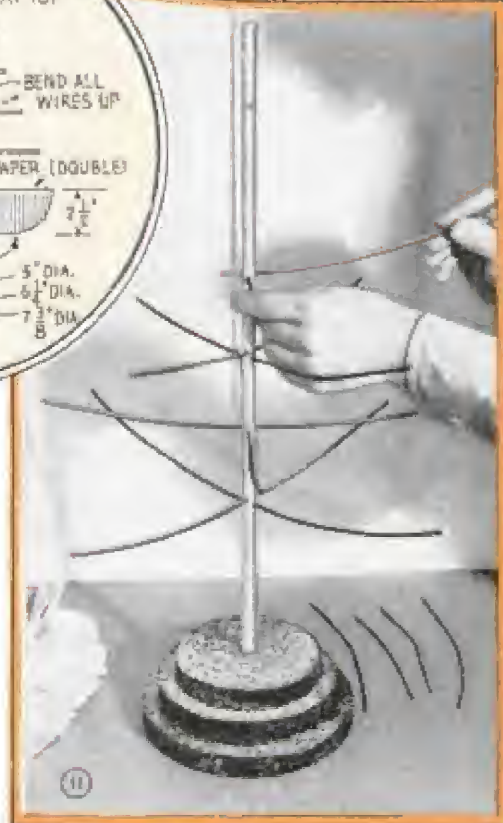
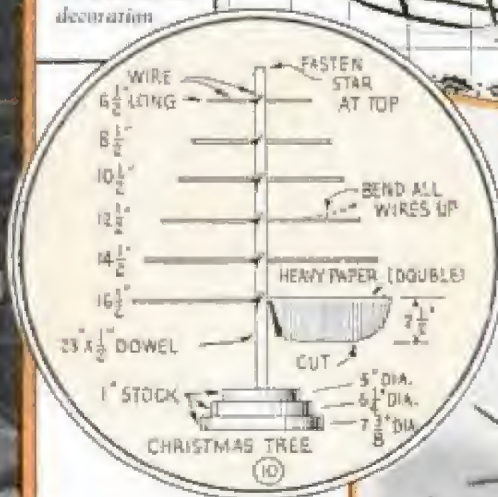
Photos Courtesy General Electric Co.



# Christmas



This seasonal cut-out has a wide variety of uses in Christmas decoration



up the whole house. Fig. 6 shows a shallow frame which fits the window opening. The frame is slotted down the center to take a pane of glass on which has been painted a suitable silhouette such as one detailed in Fig. 8. The back of the frame is covered with cardboard, and carries a field of cut-out stars backed with small squares of Cellophane. Any suitable scene can be used for the foreground, pasting it directly to the window. When lighted, the interior bulbs throw the silhouette





Above, Three Window Cut-Outs; the Silhouette Is Black Paper, While the Colored Portions Are Semi-Transparent Paper; a Small Lamp Illuminates the Moon and Stars



A Plane Picture Which Consists of Vertical Pieces Set in a Base and Illuminated with Colored Lights; Right, Ice Piles with Flashing Colored Lights; Lamps in Wire Guards Do Not Melt the Ice



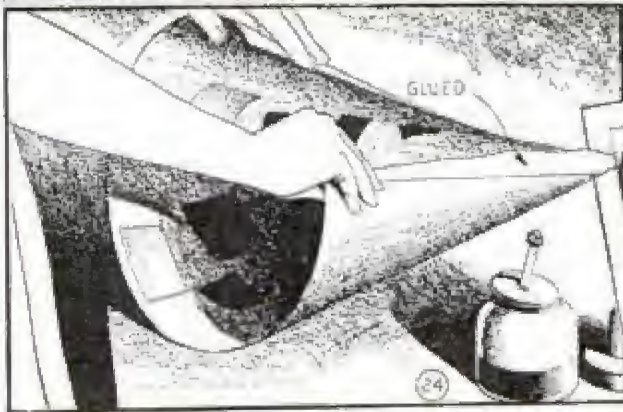
Small Plywood Christmas Trees Make Good Table Ornaments or, Indirectly Lighted, Outdoor Decoration; the Trees Should Be Decorated with Tinsel and Balls



into strong relief and color the foreground, while a separate light outside and behind the frame illuminates the moon and stars, Fig. 7. Three other forms of simple window treatment are shown in Figs. 12 to 14. Christmas trees for the table are shown in Figs. 9, 10, 11, 15, 16 and 21. A combination lamp and tree, with its Cellophane stars, Fig. 21, is especially attrac-





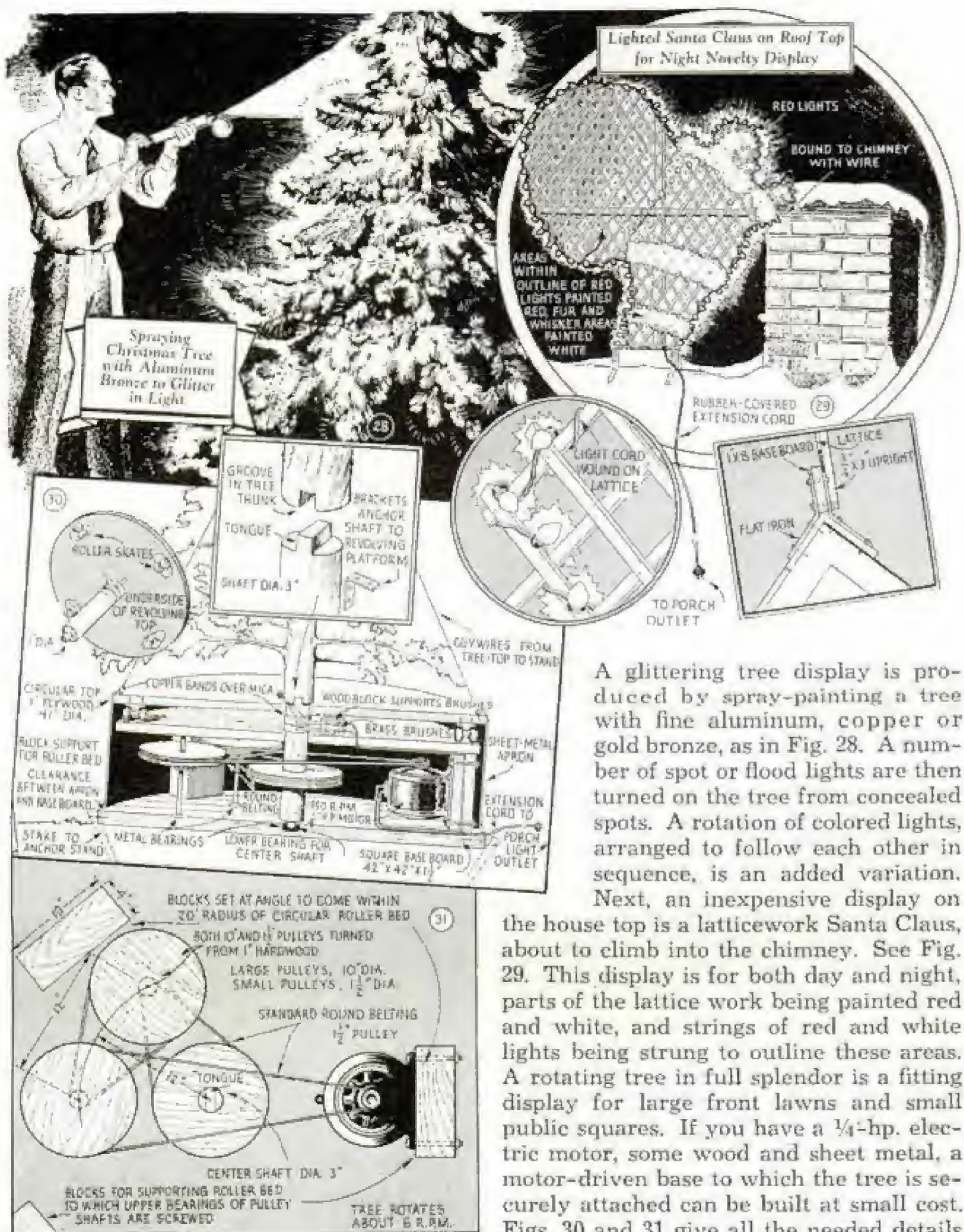


tive. Its construction is shown in Figs. 23 and 24. A number of smaller window and table ornaments, using lamps to make them effective, are shown in Fig. 22. Plane pictures, consisting of several vertical pieces, each above the level of the one just ahead of it, with colored lights between, as shown in Fig. 17, make excellent displays. An artificial outdoor tree is shown in Fig. 18, while illuminated outdoor ice piles are illustrated in Figs. 19 and 20.

There are many other simple ideas that can be applied to Christmas decoration. Colored Cellophane pictures for the fireplace, Figs. 25 and 26, may be illuminated from the rear. First a wood frame is covered with clear Cellophane, after which parts of the picture, such as the sky, trees, moon and landscape, are cut out of suitable colored Cellophane and glued to the clear piece. Where it is rather difficult or impractical to use strings of lights out-







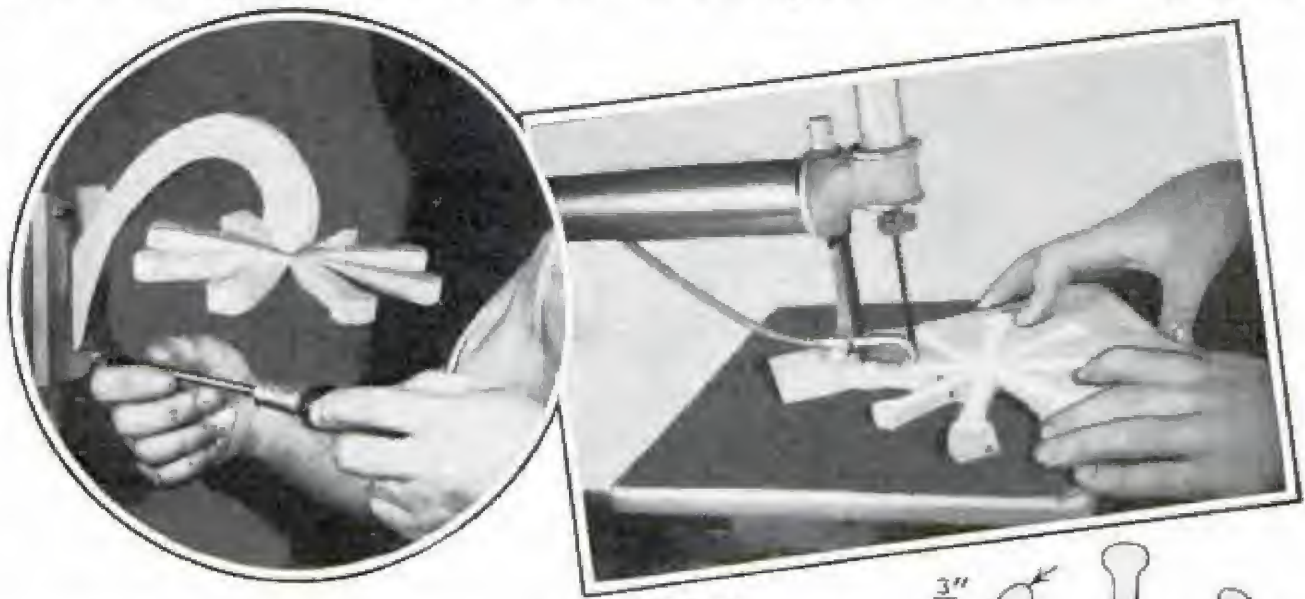
doors, colored-glass reflectors may be attached to a lattice framework, cut to the general shape of a Christmas tree as in Fig. 27. This is set where the light from passing autos will cause the imitation tree to reflect in many red and green spots, producing the effect of a light-strung tree.

A glittering tree display is produced by spray-painting a tree with fine aluminum, copper or gold bronze, as in Fig. 28. A number of spot or flood lights are then turned on the tree from concealed spots. A rotation of colored lights, arranged to follow each other in sequence, is an added variation.

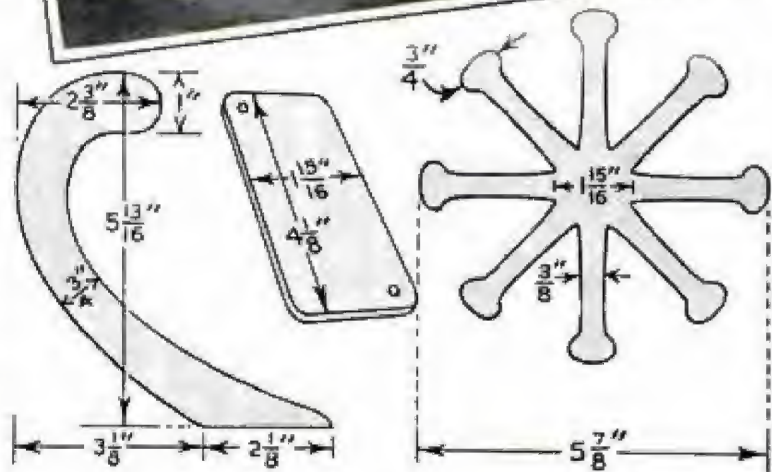
Next, an inexpensive display on the house top is a latticework Santa Claus, about to climb into the chimney. See Fig. 29. This display is for both day and night, parts of the lattice work being painted red and white, and strings of red and white lights being strung to outline these areas. A rotating tree in full splendor is a fitting display for large front lawns and small public squares. If you have a  $\frac{1}{4}$ -hp. electric motor, some wood and sheet metal, a motor-driven base to which the tree is securely attached can be built at small cost. Figs. 30 and 31 give all the needed details of construction and assembly. Be sure to follow the pulley sizes so that you will get the speed reduction needed, which should be about six r.p.m. for the tree. The sheet-metal apron, which keeps drifting snow from getting inside, is screwed on last after all necessary adjustments have been made to the driving and lighting mechanism.



## Rotating Tie Holder Occupies Small Space



Occupying little space, this rotating tie rack enables you to make a selection quickly as a light touch of the hand to turn it gives full view of the ties which can be neatly arranged on its eight arms. The rotating part may be scroll-sawed from a  $\frac{1}{4}$ -in. plywood disk, or it may consist of a small wood spool drilled for several short dowels, glued in place. A single wood screw holds the rotating piece loosely to a curved plywood bracket. This is fastened to a small piece of flat



stock which is in turn screwed to the wall. Sand the parts smooth and enamel.

## To Keep Utensils within Easy Reach on Swinging Shelves

Where kitchen storage space is provided under shelving or cupboards, you will find it highly convenient to have small shelves on the inside of the doors as shown in the photo. The utensils most frequently used are kept on these shelves because they are so readily accessible when the door is swung open. The shelves may be built of either wood or sheet metal. In both cases it is best to provide a ledge along the edge to keep the pots and pans from slipping off. If the shelf is made of sheet metal, the ledge may be part of the shelf itself, formed by bending the edge up at right angles, which will also serve to increase the rigidity.



☛ Dried coffee grounds make good filling for pincushions as they will not rust the needles or pack solidly inside the cushion.



### Novel Division Lines Improve Rule



*Lines Scratched in Surface of Rule to Indicate Division Marks, Aid in Making Line Drawings*

As an aid in quickly determining the fractional divisions on a rule when making drawings, one man marked off the  $\frac{1}{4}$ -in. divisions with lines as shown. These lines, which are scratched in the rule and filled with black paint, serve to carry the eye immediately to the division line, and will be found especially handy where the rule divisions are  $\frac{1}{16}$  or  $\frac{1}{32}$  in. apart.

### Protecting Photos against Insects

To prevent insects from destroying the gelatine coating on the surface of framed photos apply a thin coat of shellac or good varnish around the rabbet of the frame before putting the glass front in place. This will keep them from entering the



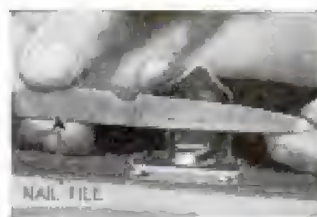
front of the frame, while a strip of heavy paper pasted over the joint between the backing and the frame with a mixture of library paste, 2 parts, and arsenic, 1 part, will keep them from entering at the back of

the frame. For unframed photos, there are several preparations on the market that

can be applied to the gelatine surface to protect it. It has also been found that prints that have been soaked in 10 per cent formaldehyde will not be attacked by insects. If the photo is mounted so that it will not be bent, a thin coat of white shellac will protect the surface.

### Repairing Worn Suitcase Latches with Pocket Nail File

Have you ever been in a hurry to catch a train and found that the small lugs on the latches of your bag or suitcase were worn so that the catches would not hold? If so, a temporary repair can be made in a couple of minutes by squaring up the lugs with a nail file so that the catches will hold until a permanent repair can be made.—Frank W. Bentley, Jr., Missouri Valley, Iowa.



### Wire Tool Removes Ice and Sleet from Clothesline

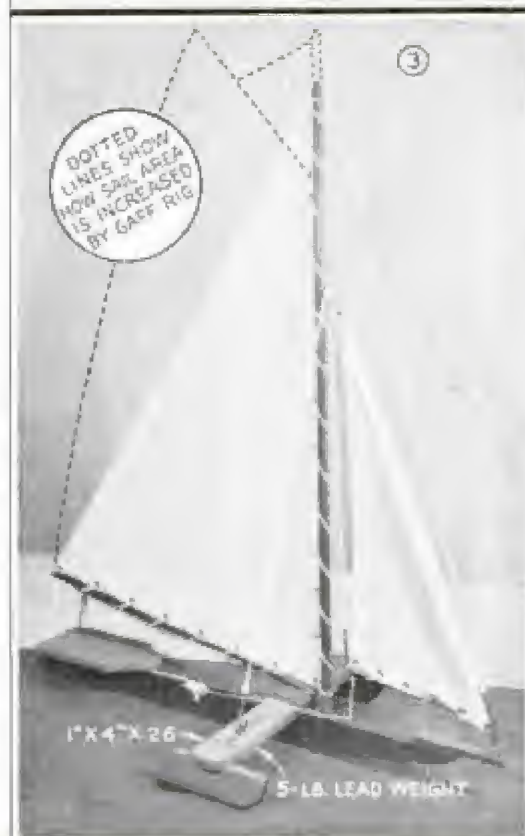
Sleet and rain frozen on a clothesline are easily removed with the tool shown. It is merely a length of heavy wire with one end coiled around the line and the



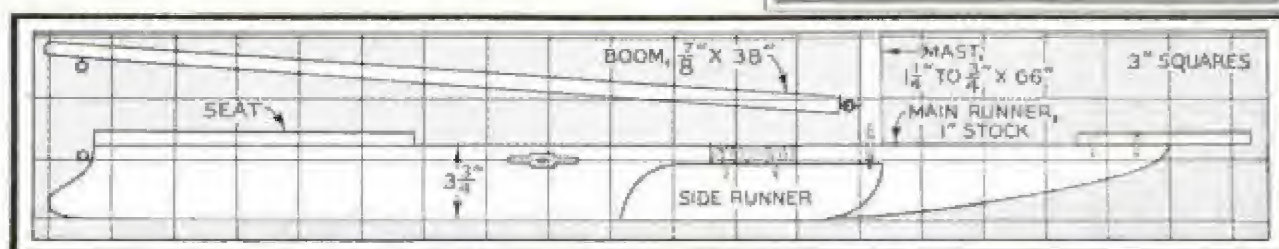
*Wire Coiled around Clothesline Provides Tool for Removing Ice and Sleet from Clothesline*

other bent to serve as a handle. When not in use, the tool may be moved to one end of the line where it will be out of the way.





**S**AIL it as a model—let it tow you on skates—ride it like a big 'un—that's the three-purpose model ice boat. First make the main runner, then the two smaller runners. The bottom of the big runner can be capped with a length of flat or round metal, but the small runners need a sharp edge in order to prevent side drift. For this purpose you can use  $\frac{1}{8}$ -in. sheet-metal shoes riveted into a slot cut in the underside of the runner, as shown in Fig. 1. Make the cross arm about 26 in. long, and slot it near each end to provide an adjustment for the 5-lb. lead weights used as ballast. These are not necessary when you ride the sled, but they are needed when the boat sails alone to prevent "hiking." The weights can be made easily by cutting a section out of a block of wood and using this as a mold, as shown in Fig. 2. The actual size of the boat can be varied up or down to suit. Do not try to crowd on too much sail; 10 or 12 sq. ft. is sufficient. If you want more canvas, use the gaff rig. This will add 4 or 5 ft. to the area without raising the center of effort.







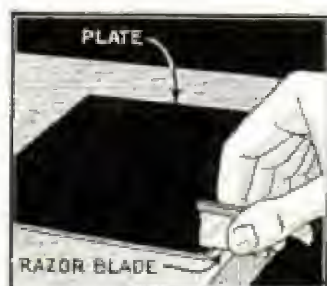
*Pulling Newly Filed Saw over Edge of a Scrap Board to Remove Burrs from Teeth*

### Removing Small Burrs from Teeth of Filed Saw

After filing a hand saw, pull it from heel to point across the edge of a scrap board. This will remove from the teeth the small burrs made by the file. Unless this is done, the burrs break off in the first saw cut made after filing and dull the teeth.—Wayne C. Leckey, Aurora, Ill.

### Using Razor Blade to Determine Emulsion Side of Photos

Amateur photographers who experience difficulty in finding the emulsion side of panchromatic plates when loading plate holders in the dark, can eliminate this trouble by using a safety-razor blade. Lay the plate on a flat surface, and with the

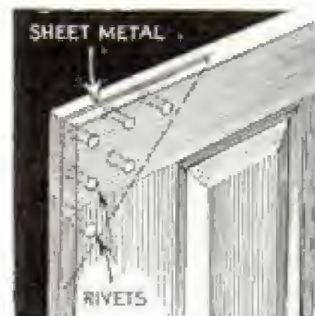


sharp edge of the blade rub the surface of the plate at one corner, at the same time applying light pressure. The blade will drag slightly on the emulsion side of the plate and

will slide easily on the glass side.—Benjamin Heller, New York City.

### Concealed Braces Help to Prevent Doors from Sagging

Sagging doors can be braced by making a saw cut in each corner as shown and then inserting triangular pieces of heavy sheet metal into the cuts. Soft-iron rivets driven into holes drilled through the wood and metal hold the braces in place. It is a good idea to use rivets short enough to permit filling the ends of the holes with plastic wood, which, when dry, can be sanded down and stained to match the door.



### Toothbrush Clamps on Drawing Board for Pen Cleaner

An effective wiper and cleaner for lettering brushes and ruling pens may be made by bending the celluloid handle of a toothbrush so that it will clamp over the edge of a drawing board. Before trying to



*Old Toothbrush Bent to Clamp over Drawing Board Serves as Pen Cleaner*

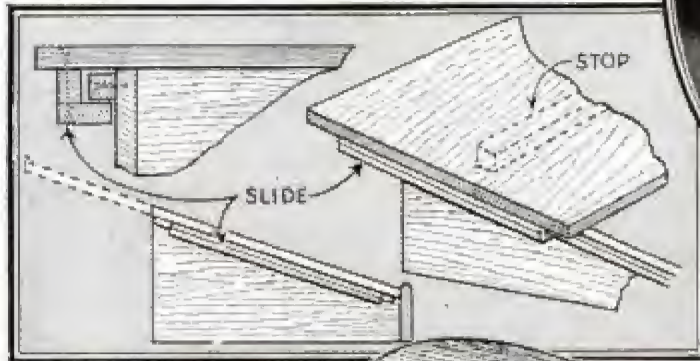
bend the handle, soften it slightly by steaming it over a teakettle spout.

¶If all the washed clothes to be ironed are hung on one line, they can be sprinkled evenly with a fine spray from a hose and rolled up as they are removed from the line, thus saving time of sprinkling.

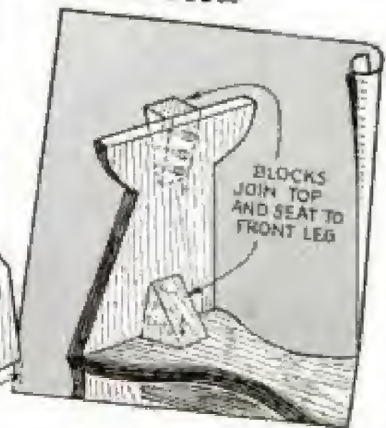
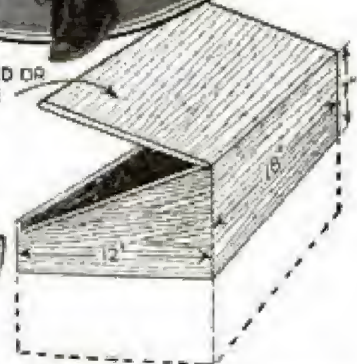
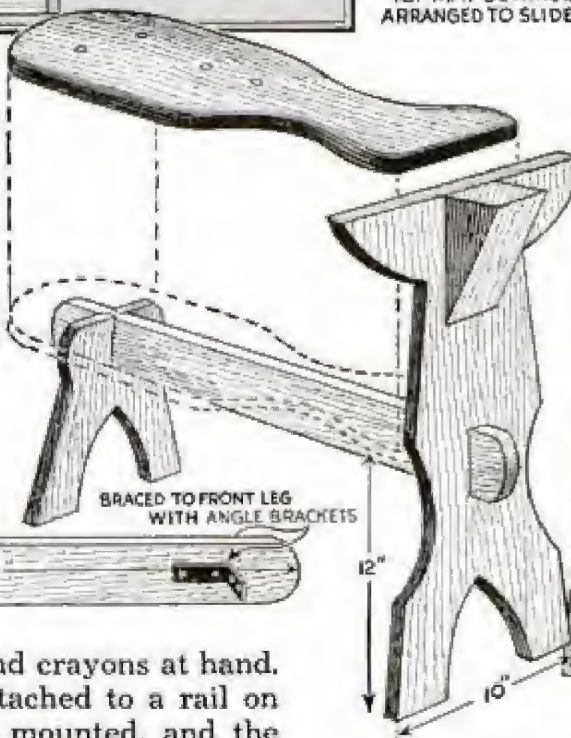
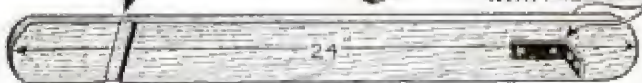


## Gay-Colored Pony Desk Has Kiddy-Car Seat

When using this novel pony desk, which delights tots of kindergarten age, the child sits astride a seat that is similar to one on a kiddy car, but instead of handle bars, there is a writing desk with a slanting top. This is arranged to slide up or is hinged at the upper edge so that the child can open it easily in order to store paper, pencils, etc., inside. A ledge along the bottom of



TOP MAY BE HINGED OR ARRANGED TO SLIDE



the top holds pencils and crayons at hand. The sturdy legs are attached to a rail on which the seat is also mounted, and the whole thing rests solidly on the floor. Although a suggested method of assembly is shown in the details, this may be altered at your discretion as necessary with the stock at hand. Painted or lacquered in bright colors, which, when dry, may be covered with a coat of clear varnish, this desk will be found highly successful in keeping the little one busy.

☐ A piece of fine wire mesh fastened to a small wood frame and hung on the wall makes a good match scratcher.

### How to Antique Masts and Yards

A realistic weathered finish on masts and yards of ship models can be produced by brushing on a coat of dark, walnut oil stain and then immediately wiping it off with a soft cloth, after which the wood is allowed to dry for about 5 min. The work is next rubbed down with a cloth dipped in varnish remover to "gray out" the initial stain. After drying overnight, the surface is rubbed down with fine, steel wool to its finished smoothness.



### Ashes Removed from Heating Stove without Raising Dust



*Closed Pail Fitted with Chute Receives Ashes Raked from Stove and Prevents Dust in the House*

To avoid getting dust in the house or ashes on the floor when cleaning your heating stove, use an ash hoe and a pail similar to the one shown. An opening in one side of the pail is fitted with a sheet-metal chute or trough, which slides under the opening in the ash pit to receive the ashes as they are raked out. The hoe handle is manipulated through a small hole in the side of the can opposite the chute.—A. H. Waychoff, Riverside, Calif.

### Drying Freshly Painted Articles in Your Oven

If it is desired to speed the drying of small wood and metal articles that have been freshly painted, slip them in the oven of your stove. While different finishes have different drying speeds, it will be found that a temperature of 125° Fahr. will dry an object in about half the time required at average room temperature. Do not exceed this temperature for wood articles as higher



temperatures are likely to drive moisture from the wood and spoil the finish. On metal articles, however, temperatures up to 160° may be used. If you are using regular baking enamel, it is best to follow the temperature directions printed on the can.—C. E. Packer, Chicago.

### Magnets Move Actors on This Miniature Stage

Young children may be kept happily entertained with a toy stage, made of cardboard, across which cut-outs of comic characters from the newspapers, or snapshots of the children themselves, are made to slide with a moving magnet held under the stage floor. A paper clip on the folded base of each cut-out adds the necessary iron which is attracted by the magnet. The sections of the stage are cut from two 22 by 28-in. sheets of poster board, or any medium-weight cardboard, and folded according to the patterns shown. Two side stretchers complete the framework which is then assembled with ½-in. paper fasteners. A sharp ice pick will be found convenient for making the holes for the fasteners. Interchangeable backdrops, consisting of sheets of colored paper on which appropriate scenes may be painted, are suspended from 1-in. strips of cardboard which rest in notches cut in the top edge of the side stretchers. The proscenium opening is finished off by simulating the folds and creases of the drapes with paint or crayon. A curtain consists of a piece of cardboard that may be slipped readily down behind the proscenium at the close of the performance and removed at the opening of the act. If it is desired to illuminate the stage, a flashlight bulb and battery may be connected, as shown, and suspended over the stage from a cardboard support fastened to the side stretchers. Oiled, colored tissue paper may be used over the light bulb to produce special lighting effects. Additional action may be had by mounting cut-outs of boats, trains, giants, dinosaurs and other large figures on sticks and manipulating them from the wings.

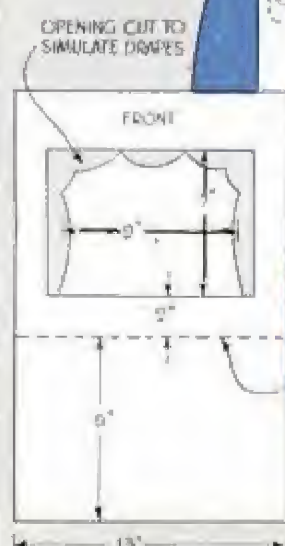
¶ If a scrubbing brush is dipped in strong salt water after using and then hung up to dry, it will be clean and will last longer.



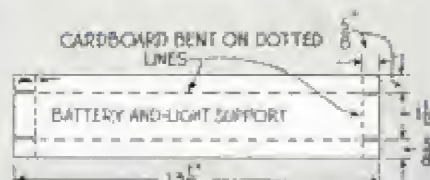
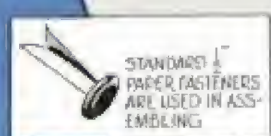
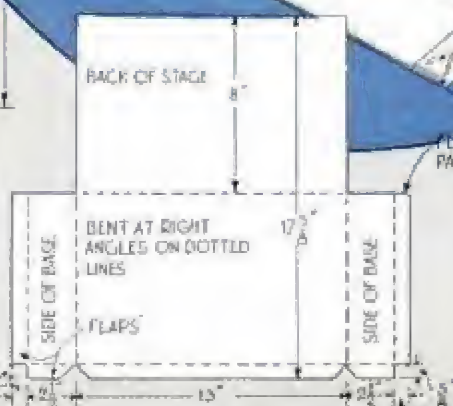
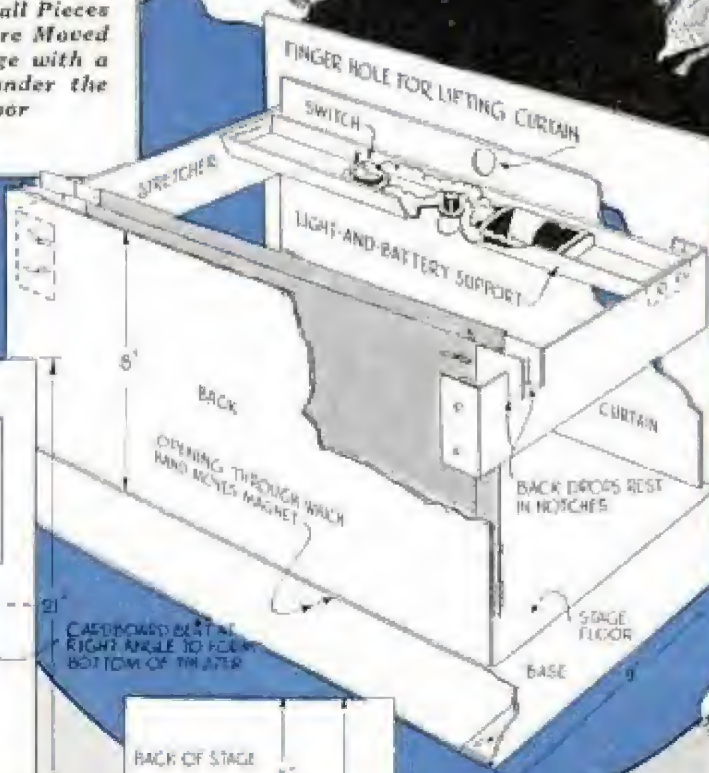
# MAGNETIC THEATER



*Cut-Out Figures on Paper Clips or Small Pieces of Sheet Iron, Are Moved Across the Stage with a Magnet Held under the Stage Floor*



*The Stage Is Lighted with a Small Flashlight Battery and Bulb*





### Paste in Collapsible Tubes Applied Neatly with Soda Straw



Using a Soda Straw to Apply Paste Contained in Collapsible Tubes Assures Neat Job

By using an ordinary soda straw, paste or cement, that comes in collapsible tubes, can be applied in small drops or in a neat

ribbon, without smearing. The straw also saves time in replacing the cap every time the tube is laid down. To fill the straw, insert one end into the tube, squeeze the paste into it and then fold over the outer end to seal it. After removing the straw, flatten the other end and apply the paste by squeezing the folded end.—Frank W. Bentley, Jr., Missouri Valley, Ia.

### Homemade Solution for Cleaning Walls

For cleaning painted walls and woodwork, an effective cleaning fluid is made cheaply by mixing equal parts of kerosene, vinegar and soft water. Rain water caught in an earthen vessel will do. To clean a wall, dip a clean, soft cloth in the liquid and sponge it, after which the loosened dirt is removed by sponging the wall with a cloth dipped in clear water. The vinegar eliminates the offensive odor of kerosene.

## BUILD YOUR BOAT THIS WINTER



"Roamer," 16-Ft.  
Outboard Cabin Cruiser

during those numerous spare hours, so that it will be ready to launch when the boating season opens. Popular Mechanics blueprints cover boats of all kinds, and among them you may find one that is suited to your needs.

"Roamer"—16-ft. outboard cabin cruiser; two berths. 6 prints, (765 to 770)—\$1.00.

"Hi-Ho"—14-ft. outboard or inboard family runabout. 6 prints, (840 to 845)—\$1.00.

"Pop's"—Speedy 12-ft. Class-A racer with step bottom. 2 prints, (813 and 814)—50c.

16-Ft. Canoe—Cedar planking covered with canvas. 2 prints, (811 and 812)—50c.

14-Ft. Outboard Motor Boat—Round bottom with step. 2 prints, (645 and 646)—50c.

15-Ft. Rowboat—Flat bottom; heavy transom for outboard. 1 print, (644)—25c.

12-Ft. Sailing Skiff—Flat bottom with centerboard well. 2 prints, (524 and 525)—50c.

Double End Duck Boat—Wooden frame covered with canvas. 10 ft. long. 1 print, (703)—25c.

12-Ft. Rowboat—Sturdy flat bottom; fine for rental purposes. 1 print, (707)—25c.

**POPULAR MECHANICS 400 Blueprints** also include plans on woodworking, metal work, homemade shop machinery, toys for the children, novelties and craft work, besides a wide range of model-making projects. A complete list will be sent for 3c to cover mailing costs. Address Popular Mechanics Blueprint Department, 200 E. Ontario Street, Chicago.





## Titles Washed into Scenes of Marine Movies



*Underwater Scenes for Home Movies Simulated by Photographing Goldfish in Aquarium Containing Marine Plants*

Appearing on a screen as though they were washed in by a wave, appropriate titles for home movies of marine scenes are made as shown in the left-hand detail. The title is first lettered in the surface of wet sand, and then photographed upside down. Allow sufficient time for exposure of the title and then have someone standing outside of the lens range throw a bucket of water over the sand with a sweeping motion. In order to get the title

to appear correctly on the screen, the portion of the finished film containing the title is cut out, the ends reversed and then cemented in place.

The right-hand drawing shows a simple method of getting underwater scenes of fish and plants. The camera is merely held against an aquarium as the scene is taken. Use only a rectangular aquarium with sides of clear glass, otherwise the image will be distorted on the film.

## Heavy Cardboard Folded over Clothesline Spaces Garments

When coat hangers are used to hang garments on a clothesline to dry or air out, it is a good idea to fold a piece of heavy cardboard over the line and suspend the hangers from it as shown. This prevents the garments from sliding together if the line sags and keeps them spaced so that air can circulate freely around them. The cardboard is perforated near the lower edge to receive the hangers.

### Use a Fine-Tooth Saw for Cutting Thin Metal

When sawing thin metal, use a fine-tooth blade so that at least two of the teeth are in contact with the metal all the time as the saw is pulled across it. With a coarse blade the edge of the metal gets between the teeth and may break them.

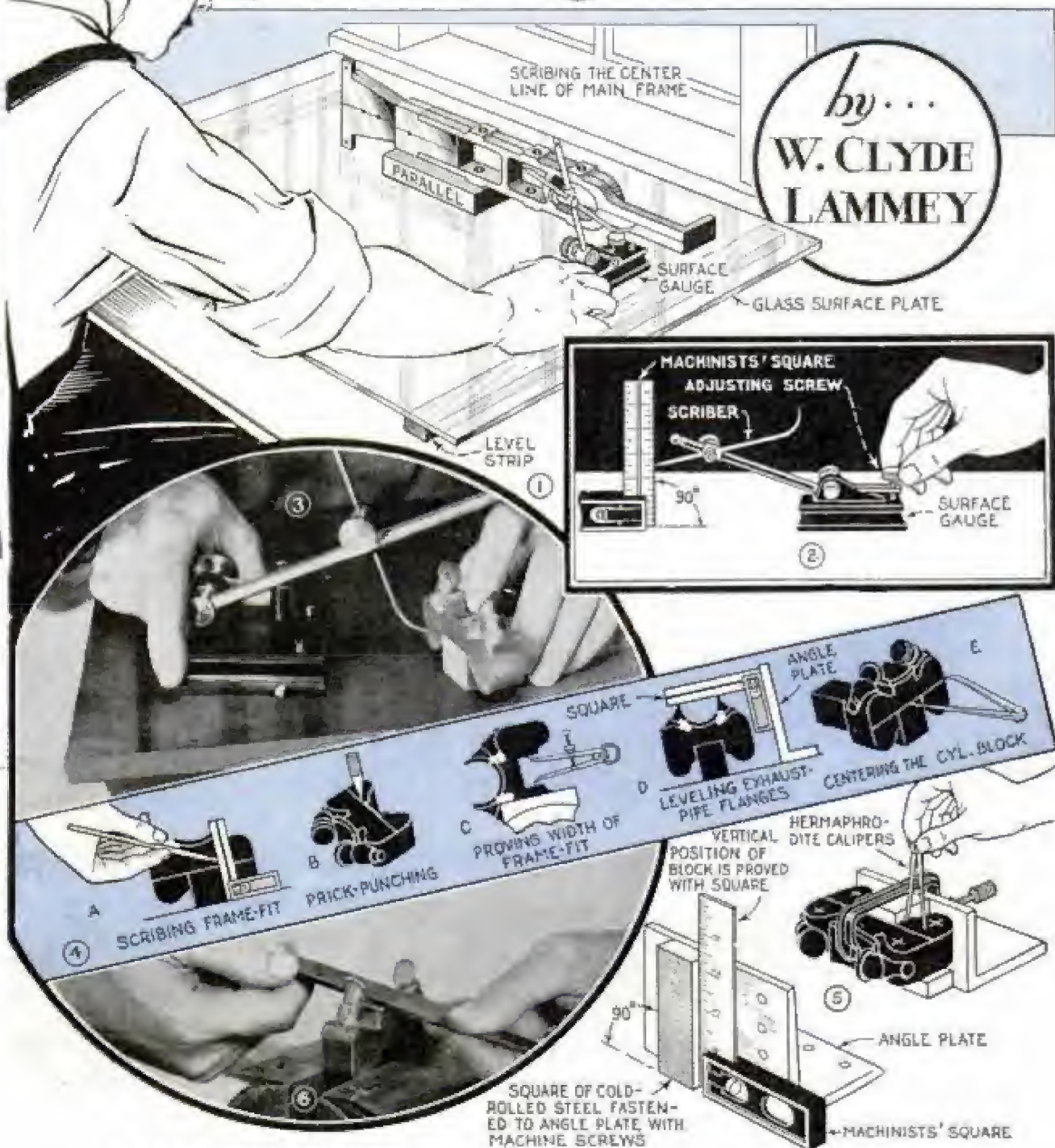




3017 Carroll Ave  
Chicago  
Tel. Nevada 6373  
**Building MODEL**



by...  
**W. CLYDE  
LAMMEY**



### PART I, THE CHASSIS

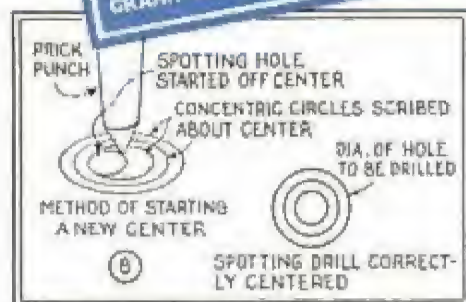
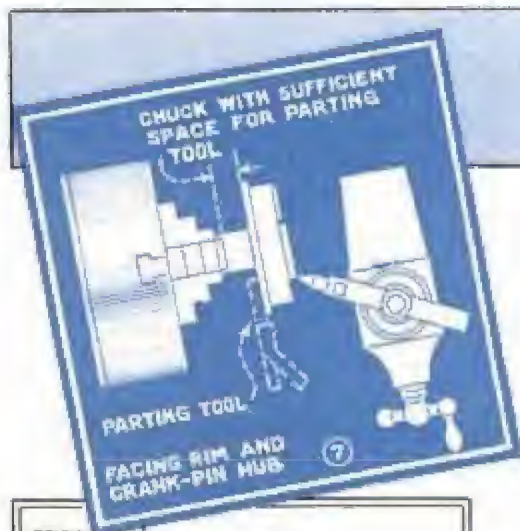
AS a rule, the main frame in a set of small-scale castings comes drilled for drive-wheel axles, and the main section of the frame is milled accurately to size. Set up the main frame as in Fig. 1 and scribe a center line with a surface gauge. In this operation, set the surface gauge as in Fig. 2. A piece of heavy plate glass will serve for a surface plate. Next, fit the cyl-

inder block to the frame and scribe the exact location of all holes for the dummy cylinder heads as in Figs. 3, 4 and 5. In this work you will need an angle plate and several squares of cold-rolled steel for use as parallels and locating blocks as indicated in the details A to E of Fig. 4. To make an angle plate, cut a short length from a piece of heavy angle iron and have the



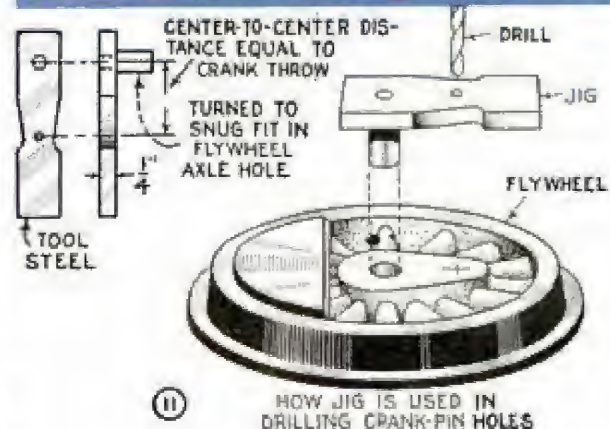
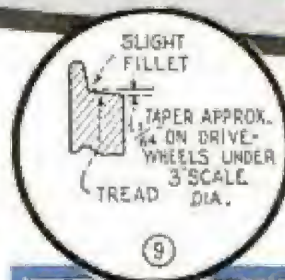
Scale models done  
15/6 S. Wabash  
Chicago

# LOCOMOTIVES



Complete kits of parts, furnished by manufacturers, make the hobby of building scale-model locomotives increasingly popular. The castings in the kits are either rough so you can finish them yourself, or are finished so you need only assemble them.

two outer faces milled true in a machine shop. Drill a number of holes through the halves of the angle, so that you can fasten steel squares to the plate as in the lower detail of Fig. 5. Before drilling, carefully check all your measurements with the blueprints. Prick-punch the centers and scribe two or more concentric circles as in Fig. 8. Then set up the cylinder block for spotting and drilling as in the upper detail of Fig. 5. First spot the holes with a drill smaller than the diameter of the finished hole as in Fig. 8. Start this drill with very light pressure to prevent creeping. Re-check before final drilling. Any holes spotted slightly off-center may be re-centered with a new prick-punch mark. After the



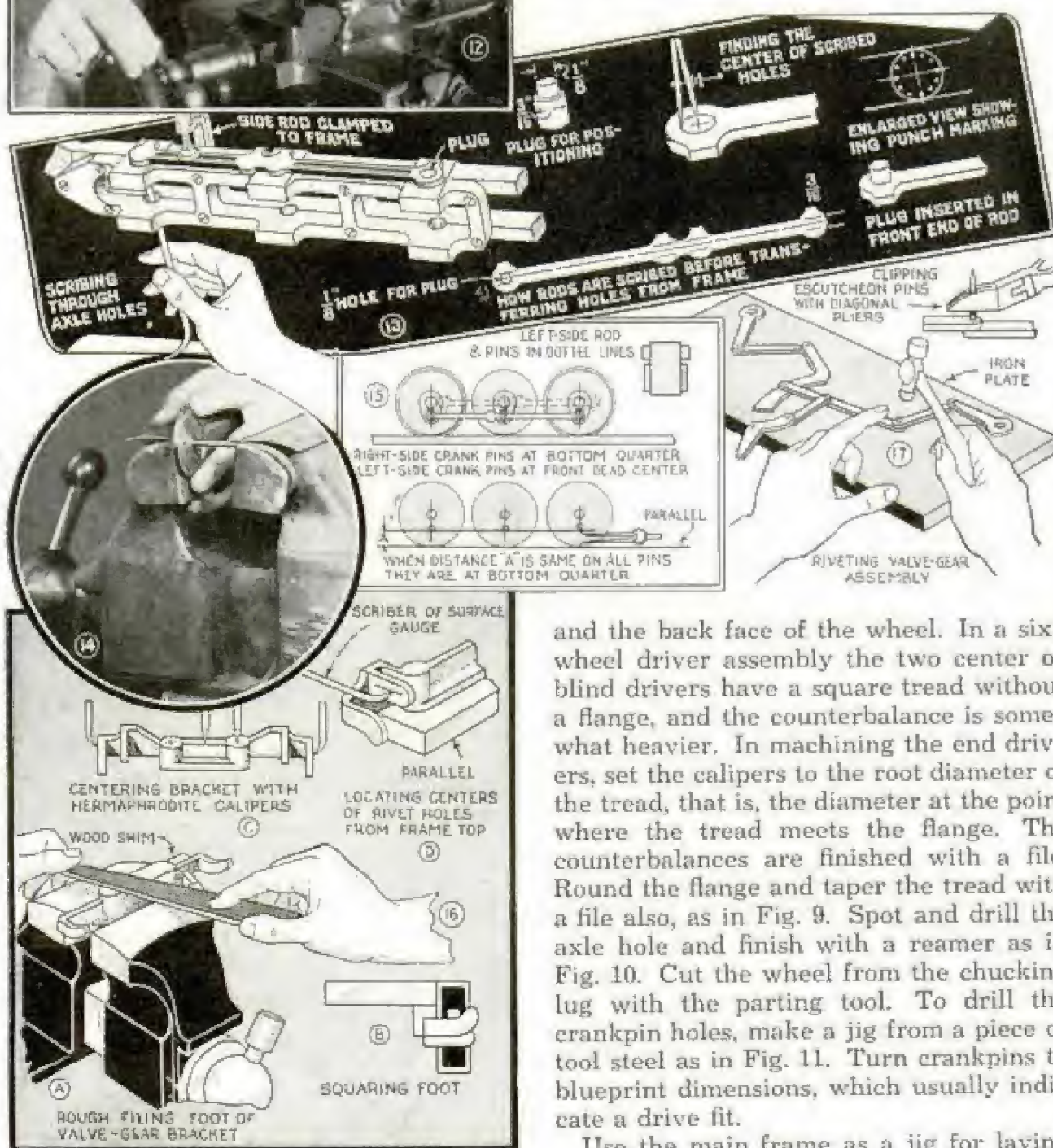
metal using lathe - South Bend, LaCrosse Co. South Bend, Ind.





drilling is done, true the cylinder-block faces with a file, Fig. 6, check for length and width, true up the boiler saddle and steam pipes to the required radius and drill and tap the necessary holes for attaching the block to the frame. The dummy cylinder and valve-chest heads and the crosshead guides can be left until later in the assembly.

Small-scale drive-wheel castings usually come with a chucking lug or boss cast on the back face. True the chucking lug first with a light cut, reverse the wheel and re-chuck as in Fig. 7, allowing space for the parting tool between the chuck jaws

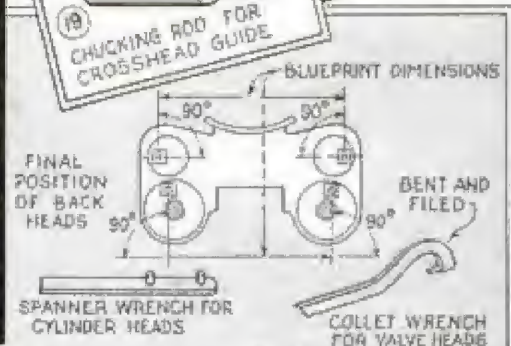
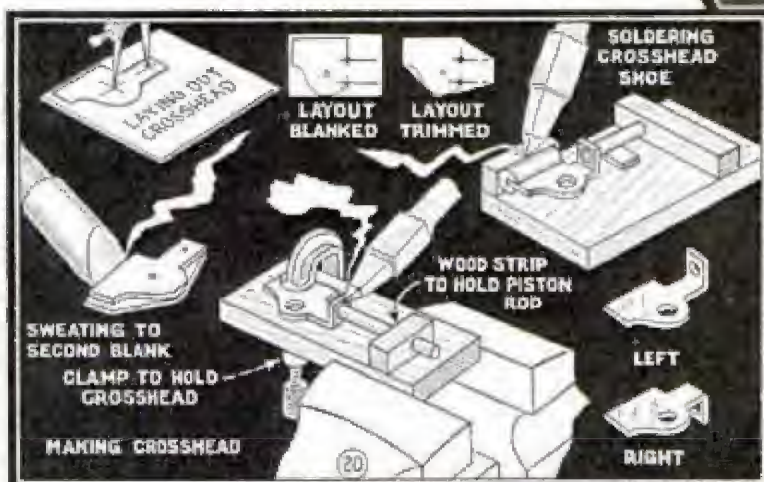


and the back face of the wheel. In a six-wheel driver assembly the two center or blind drivers have a square tread without a flange, and the counterbalance is somewhat heavier. In machining the end drivers, set the calipers to the root diameter of the tread, that is, the diameter at the point where the tread meets the flange. The counterbalances are finished with a file. Round the flange and taper the tread with a file also, as in Fig. 9. Spot and drill the axle hole and finish with a reamer as in Fig. 10. Cut the wheel from the chucking lug with the parting tool. To drill the crankpin holes, make a jig from a piece of tool steel as in Fig. 11. Turn crankpins to blueprint dimensions, which usually indicate a drive fit.

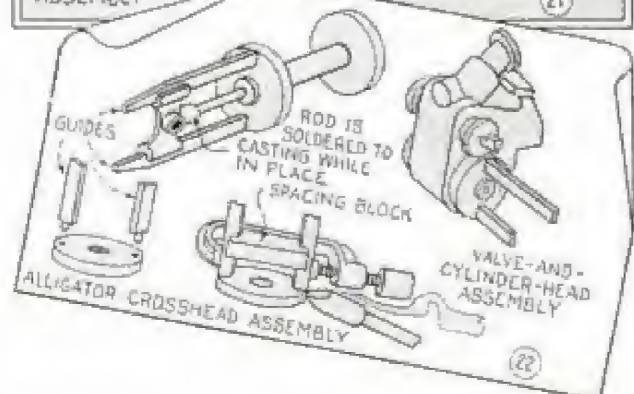
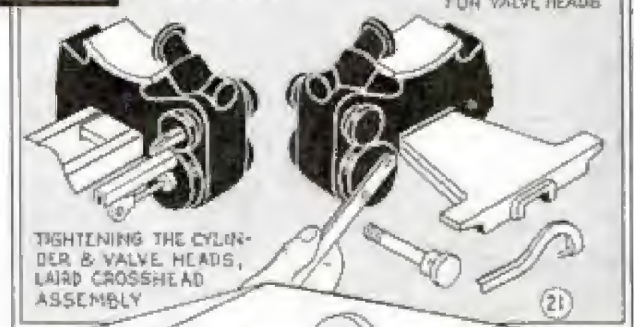
Use the main frame as a jig for laying



out and drilling the holes in the siderods as in Fig. 13. Cut the drive-wheel axles to length from the material supplied with the castings. Press an axle into each of the two end drivers and the one center driver, using an arbor press or a vise with copper-lined jaws as in Fig. 14. At this stage fit the composition drive gear. On the Pacific-type locomotive this gear is mounted on the rear drive-wheel axle while on the Hudson type it is mounted on the center drive-wheel axle. On others the location



of the driving gear is governed by the design of the model. Assemble this gear on the axle according to your blueprints. Place the axles in the main frame with the three wheels on one side, and start the remaining three wheels on the axles, using hand pressure only. Usually a thin washer goes between the wheel hub and the frame. Slip a siderod on the pins of the drivers that are fully seated on the axles and set the assembly on a surface plate. With an outside caliper, set the rod on the bottom quarter as in Figs. 15 and 18. Turn the wheels on the opposite side until the siderod will slip on. Then set these wheels on the forward quarter, turning them by hand and making sure that the first three do not move from their original position. Roll the chassis on the surface plate. If the rod binds as it crosses the dead centers, turn the loose wheels slightly until the assembly revolves freely. Then remove the rod and force the wheels on the axles. This simple method is sufficiently accurate for the purpose and saves the time necessary to make up a special jig. At this stage the chassis is ready for the motion work consisting of the valve gear, generally of the



Walchaert type, the crossheads and valve-guide assemblies and the cylinder and valve heads. First prepare the valve-gear bracket casting as in Fig. 16, in the order indicated by letters. Then make up the valve gear, which in small-scale models is usually made from German silver and riveted together with escutcheon pins as in



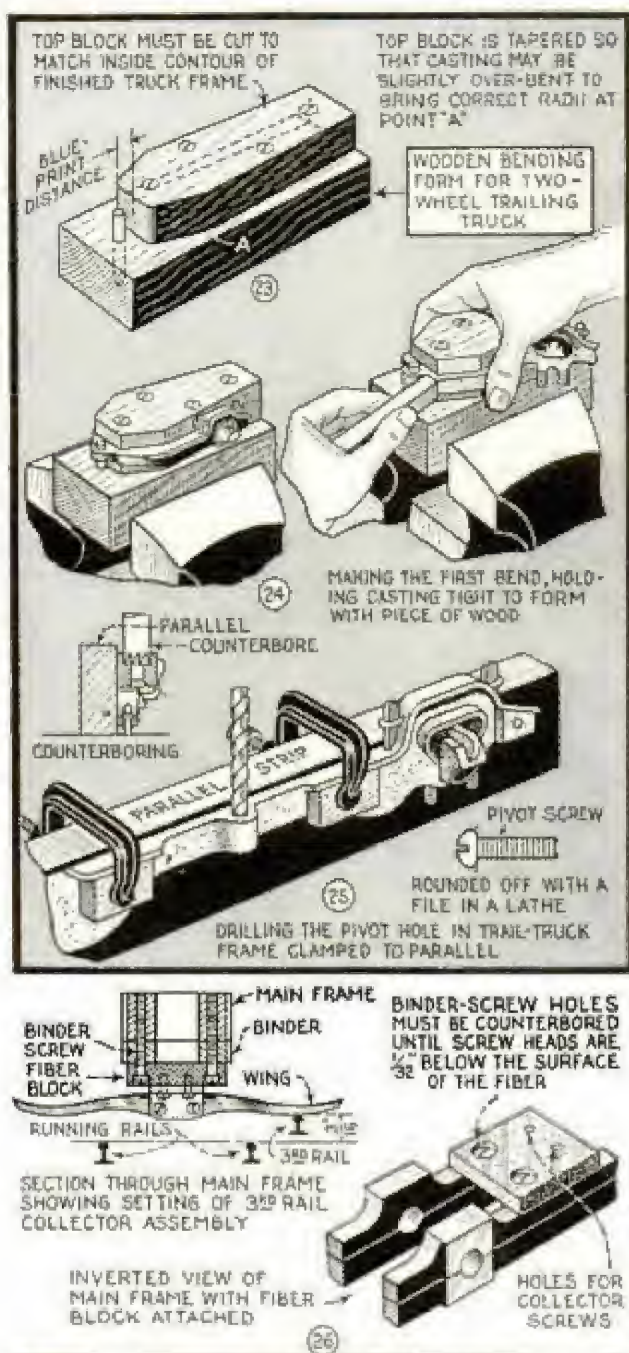
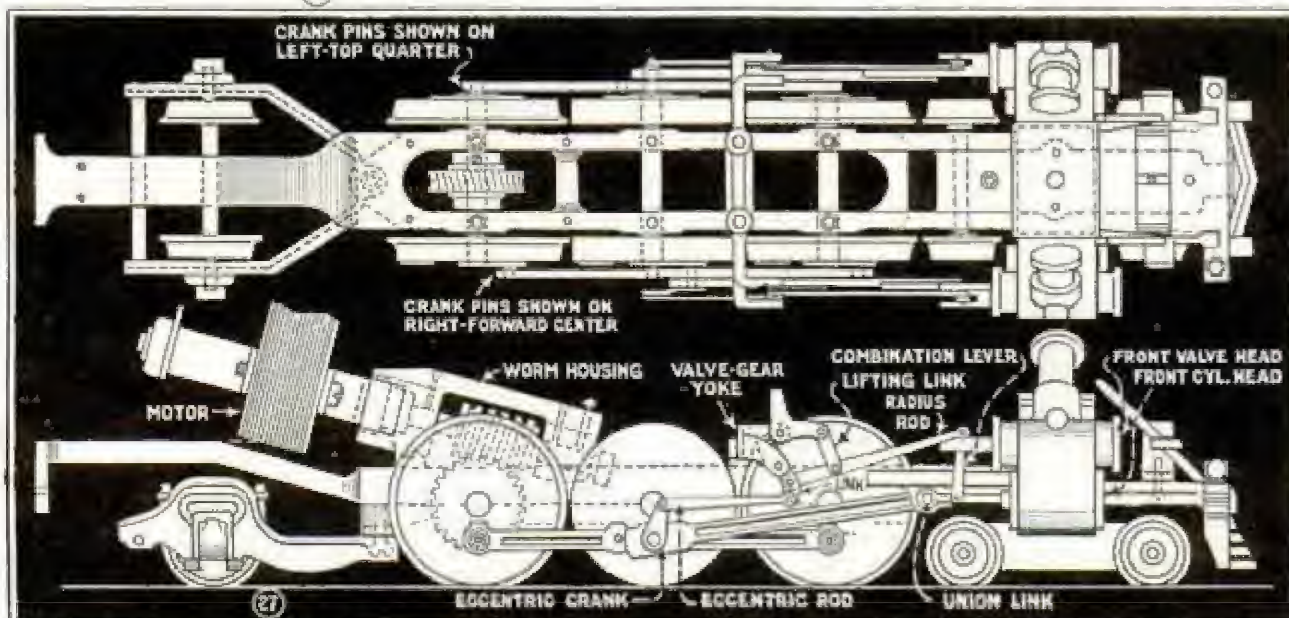
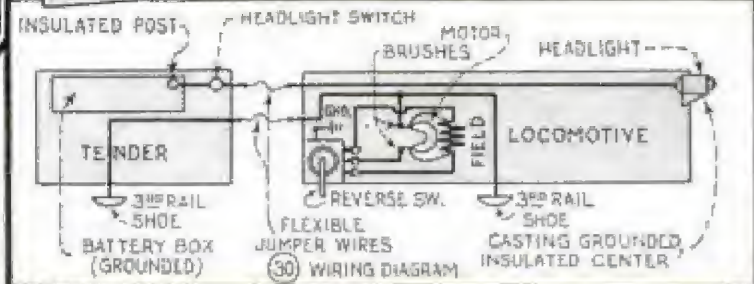
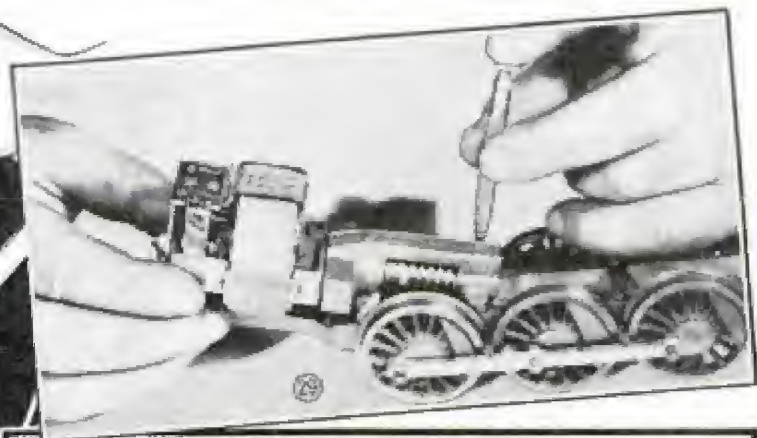


Fig. 17. Fit the valve-gear bracket on the main frame, then turn out the cylinder and valve heads to blueprint dimensions. The crosshead used in small working models is generally of the Laird type, made from German silver. Fig. 20 shows the various steps in making up this type of crosshead. A useful kink for holding the square stock in a three-jaw chuck is shown in Fig. 19. The small rolled-steel square from which the Laird-type crosshead guide is made, is pressed into the end of a short length of thick-walled brass or steel tubing slotted along the length as shown. The necessary round projection is turned on the end of the square, which is drilled lengthwise to take the round crosshead shoe. The rounded end fits in a hole drilled in the back cylinder head where it is soldered. The complete assembly of the cylinder heads fitted with the Laird-type crosshead is shown in Fig. 21. With this done, hook up the valve gear and the main rods to complete the assembly. The alligator-type crosshead assembly, as shown in Fig. 22, is more commonly used on large-scale models.

Wheels for the lead and trailer trucks of the locomotive and also the tender truck wheels are a straight duplicate turning job on cold-rolled steel as in Fig. 12. When turned to finish size the wheels are chucked individually and center-drilled for the axles. The latter are usually shouldered on the tender and trailer trucks but are straight on the locomotive lead truck due to the design of the frame. Where the truck is of the outside frame type, such as

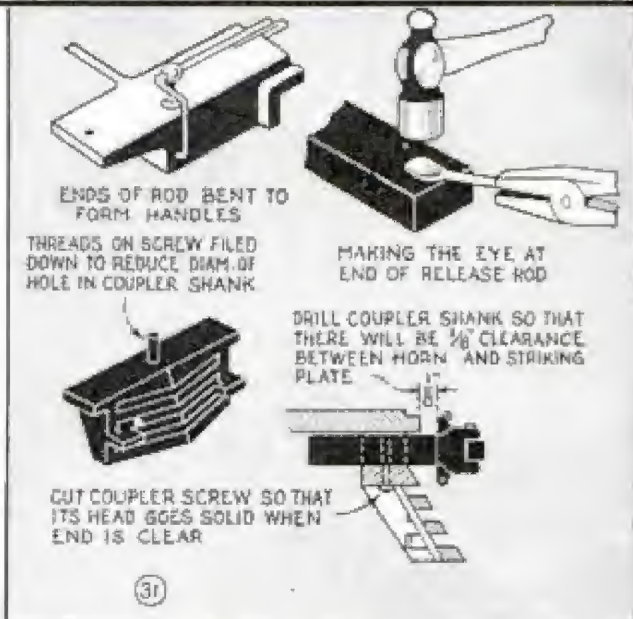






tender and locomotive trailer trucks either two or four-wheeled, the axles project beyond the wheel hub and enter holes drilled in the side frames on which are cast the dummy axle boxes. The frame for the locomotive lead truck and also the frames for the tender trucks require practically no finishing as they come in complete units. It is only necessary to locate and drill the holes for the axles and the screws which attach the complete truck to the frame. On some models the truck frames are in three parts, a center crosspiece and two side members which must be joined with screws to form the complete unit. Figs. 23, 24 and 25 show how the two-wheeled locomotive trailer truck frame is formed. This is furnished as a soft casting and must be bent to the proper shape over a wooden form as in Fig. 24. This truck is used on the Pacific-type locomotive.

The drive unit of the electrically driven locomotive consists of the motor, worm, and a cast housing which is fastened to the main frame with screws and supports both the motor and driving worm. The housing is drilled and reamed to form bearings for the projection of the motor shaft which carries the worm gear. The latter is keyed to the shaft with a transverse pin and provision is made to take up the end thrust. The drive unit is then mounted on the main frame as in Figs. 27 and 29. The worm housing is somewhat oversize in the rough casting and it will likely be necessary to file down the mounting lugs or feet so that the worm meshes properly with the



fiber gear. This part must be fitted with care to insure a free-running drive. Fig. 27 shows the assembly of a Pacific-type chassis, the construction of which is typical of small-scale, electric models.

The usual manner of mounting the third-rail collector shoes is shown in Fig. 26. The shoes are generally furnished complete. Fig. 30 shows a typical wiring diagram for third-rail operation. Before wiring up completely, connect the motor leads to a transformer and run the chassis under power for a time to break it in. To finish, fit and attach the pilot, the pilot and tender couplings and the release rods as in Figs. 28 and 31.

(To be continued)





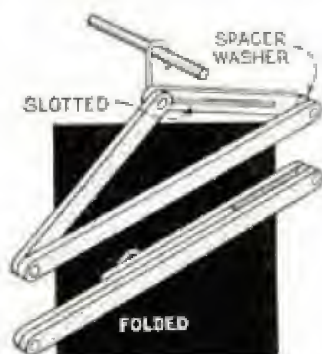
*Flexible Cleaning Brush for Removing Soot from Radiating Drum in Hot-Air Furnace*

### Furnace-Cleaning Brush Has Flexible Handle

After many discouraging attempts to remove soot from the radiating drum in a hot-air furnace, I made a brush from a length of old garden hose and pieces of screen wire. The hose was split at one end and several squares of the screen wire inserted and riveted in place as indicated. When forced into the flues, the rubber handle of this cleaner allows the brush to follow the curves, and a twisting motion scrapes the soot from the entire surface.—G. E. Hendrickson, Argyle, Wis.

### Coat Hangers That Fold Flat

Coat hangers made as shown will fold compactly and will take very little space

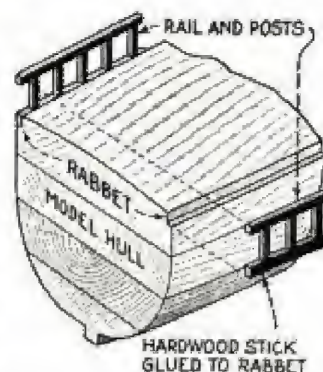


in your bag or suitcase. Get three strips of hardwood, one 16½ in. long and two about 9½ in. long. Cut a slot in one of the short strips and then assemble them as indicated with small machine screws, using a spacing washer at one end of the longer strip so that the hanger will fold

flat. After driving the nuts down on the screws so that the strips pivot easily, cut off the ends and rivet them over the nuts, smoothing the ends with a file to prevent tearing the clothing.—Chas. Tyler, Chicago.

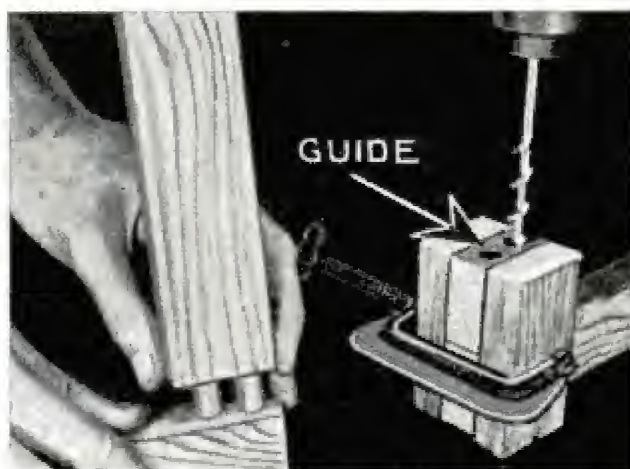
### Making Strong Ship-Model Railings

As most ship-model hulls are carved from soft wood, the posts supporting the rails loosen and get out of line, which results in frequent repairs. To eliminate this, a small rabbet is cut into the top edge of the hull where the rail is to be fitted, after which a piece of hardwood of the same size as the rabbet is drilled to receive the rail posts at the specified intervals. The rail is then built up with the hardwood stick as a base. When completed, this assembly is glued into the rabbet, and irregularities are sanded off flush with the hull.



### Guide for Drilling Dowel Holes

An accurate guide for drilling dowel holes is made easily from a hardwood block by drilling two holes through it as shown. In use, the guide is placed over



*Hardwood Block with Holes, Clamped to Work, Is Useful Guide for Drilling Dowel Holes*

the work where the dowel holes are to be drilled and held in this position securely by means of two blocks clamped to the work as shown in the right-hand detail.



## BELT SANDER *run by* DRILL PRESS

**M**ADE from a few pieces of scrap wood and four ball or roller-bearing skate wheels, this simple sanding attachment can be used on any drill press and will greatly increase its scope of usefulness. While the attachment was designed for sanding small and medium-sized wood parts, the dimensions can be altered to give it larger capacity with equally good results.

The first step is to make the rollers. Drill holes lengthwise in the ends of two 8-in. lengths of 1½-in. hardwood for the spindles. The holes must be centered and must be in perfect alignment, and just large enough so that ¼ by 2-in. bolts can be driven in to a tight fit. Three bolts are used and a 3-in. length of ¼-in. steel rod, which is to project beyond one of the wheels to serve as a drive shaft as in Fig. 1. Cement or waterproof casein glue may be used to help hold the bolts tightly. After driving them home, cut off the heads and set up in a lathe so that the blocks can be turned down to 1⅝



in. diameter. This method will assure getting the bolts concentric with the rollers.

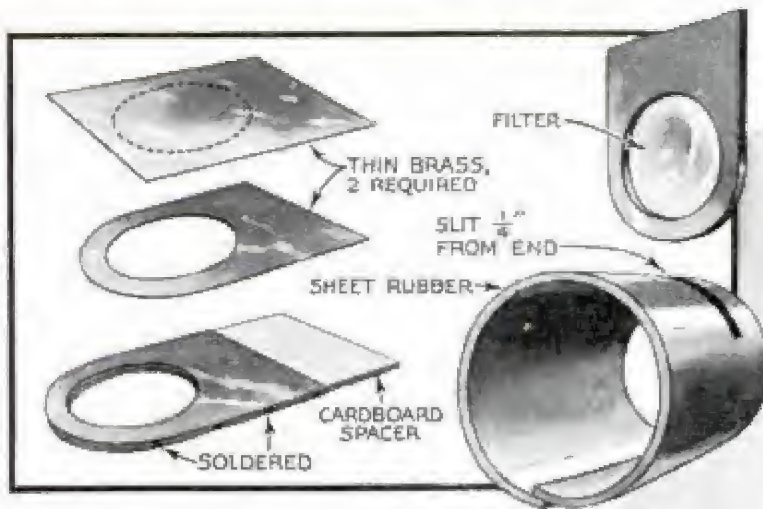
The frame is then assembled. It consists of two lengths of hardwood, 3 by 14 by ⅝-in. At one end of each a hole is drilled to receive a skate wheel which should fit snugly. Also, be sure that the holes are centered the same distance from the ends. The bearing holes at the other end of these



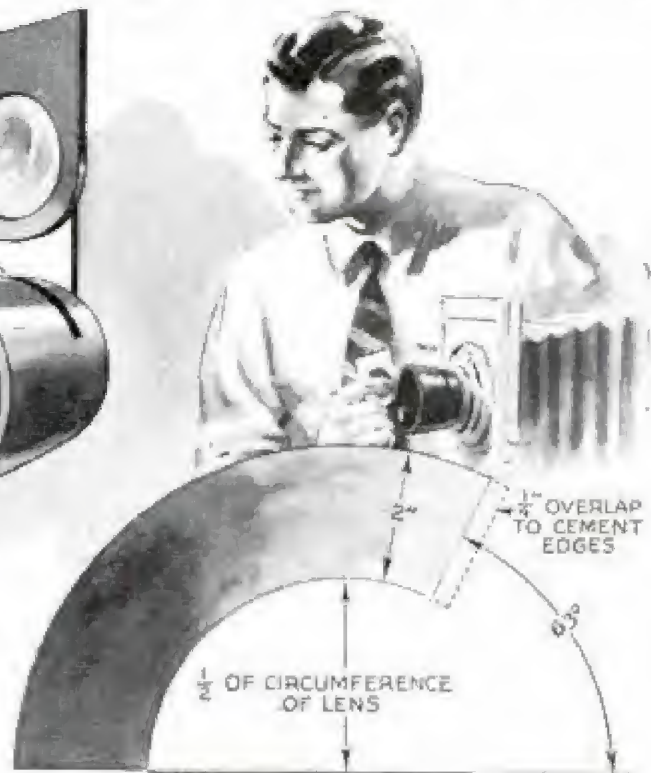




## A Combination Lens Hood and Filter Holder



Fitting snugly over a camera lens, this hood, which also serves as a holder for inexpensive gelatine filters, is made easily from a piece of inner-tube rubber. The pattern is shown in the lower detail. After cutting the rubber, cement the ends together with rubber cement. Apply a thin film of cement to each edge, allow the cement to dry and then press the rubber together firmly, holding it between two blocks and a C-clamp. A narrow slit is then cut about  $\frac{1}{4}$  in. from the small end to take the filters, which are slipped into small brass frames. These are made from two pieces of thin sheet brass slightly larger than the lens of the camera. Clamp



the pieces together and drill a series of small holes as indicated by the dotted lines. Then cut out the center portion, smooth the edges with a file and round the lower edge as shown. After slipping a cardboard spacer between the pieces, the sides and rounded end are soldered together at the edges.

## Cardboard Disks Cut Quickly with a Safety-Razor Blade

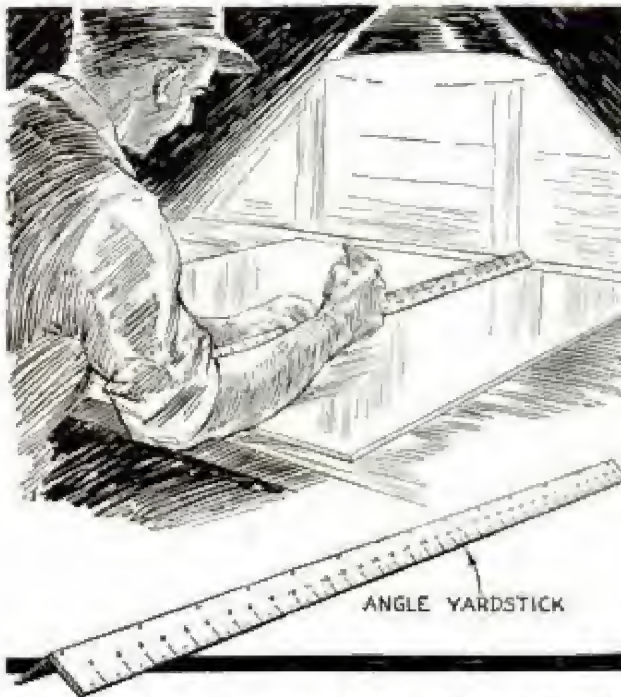
To cut true disks of any diameter from cardboard, paper, etc., without a special compass cutter, place the work on top of a pine board, bench or table top, press a thumb tack through the center and press the corner of a safety-razor blade through the cardboard and into the bench at the determined radial point. The blade should be imbedded firmly in the wood and the cutting edge in line with the circumference of the disk. Then by pulling the cardboard against the razor slowly you will have no trouble in cutting out the disk.

While paraffin is often used on stored lumber to prevent checking and warping, an application of kerosene will produce better results; lumber coated with kerosene may be exposed to excessive heat without warping or checking.



Cardboard Disks of Any Diameter Are Cut Easily with Aid of Thumb Tack and Razor Blade





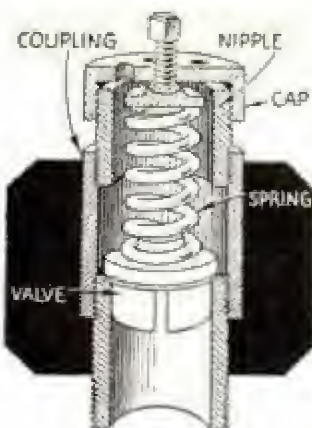
*For Cutting Glass, Two Yardsticks Screwed Together Provide an Angle Straightedge That Lies Flat*

### Angle Yardstick for Cutting Glass

Screwed together at an angle as shown, two hardwood yardsticks provide a straightedge, that will not warp, for cutting glass. Besides lying flat on the glass, the edges provide firm anchorage, making it easy to hold the straightedge in place, with less tendency to slip.

### Efficient Safety Valve for Boilers and Compressed-Air Tanks

An adjustable safety valve that can be set to open at almost any pressure can be made from a coil spring, two pipe nipples, a coupling, cap and a set screw. The inside edge of the lower nipple is beveled to fit a corresponding bevel on the valve,



which can be turned from a pipe plug or a short piece of round brass. The upper end of the valve is turned down to fit inside the spring, which may be an auto valve spring. After drilling and tapping the cap for a set screw to adjust the spring

pressure, turn a metal disk with a boss on the lower side and place it under the

set screw with the boss extending into the end of the spring. Drilling holes in the cap for steam or air to escape completes the job.—G. H. Meyer, Blackduck, Minn.

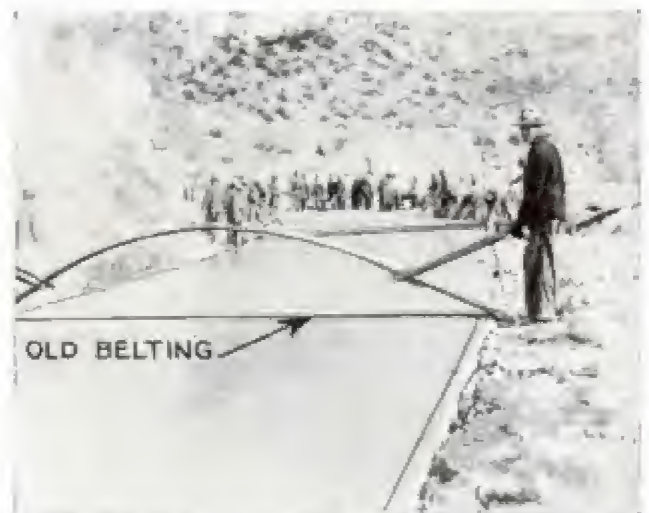
### Hoods on Signal Lamps Prevent Rain Extinguishing Flame

To prevent rain from extinguishing the flame on bomb-type signals used on a road-construction job, a contractor fitted them with hoods. These were made of sheet iron and supported by brackets of the same material riveted on and bent, as shown by dotted lines, so they could be clamped around the necks of the signals, permitting quick detachment.



### Concrete Smoothed with Finisher Made from Old Belting

In finishing concrete roads, one contractor found that a smooth job could be done quickly with the finisher shown in

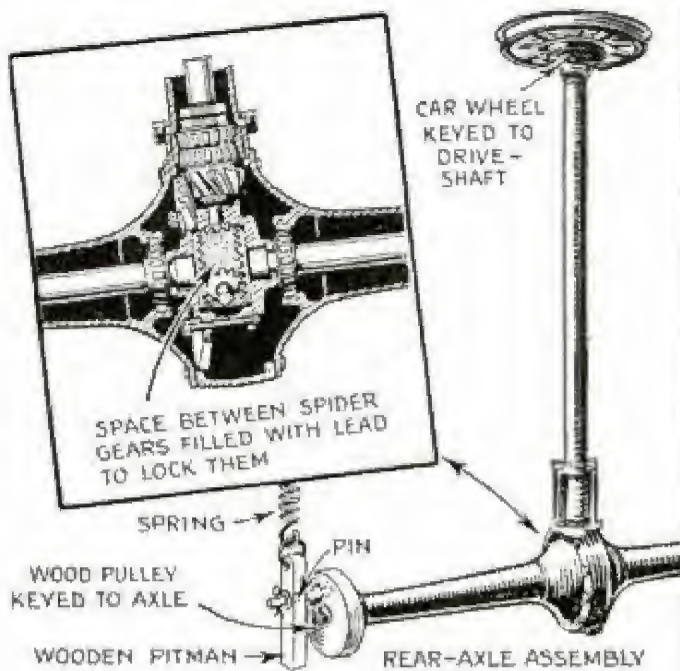


*Length of Old Belting Stretched over Ends of Bowed Board Smooths Freshly Poured Concrete*

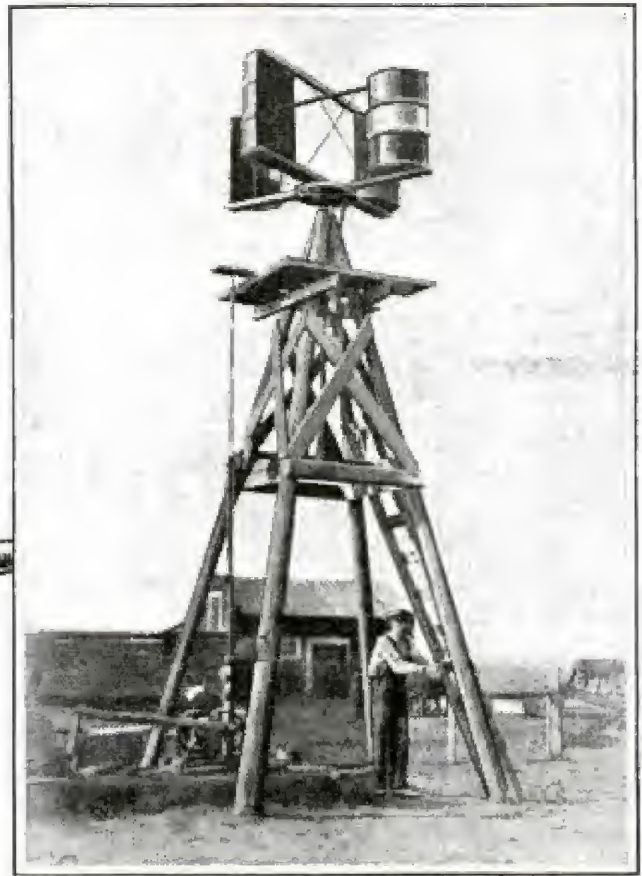
the photo. It is made by nailing a strip of old belting over the ends of a bowed board. Handles of discarded plows, bolted to the board, permit two men to move the finisher without stooping.



# Serviceable Windmill Built from Junk Parts



This windmill cost the owner nothing as he had the junk parts from which it was built. Two oil drums are cut in half vertically to provide the vanes, which were mounted on a wooden frame to rotate on a horizontal plane. The frame was centered and securely fastened to an auto wheel by means of U-bolts, and the wheel was then keyed to the end of a driveshaft on a rear-axle assembly, which was rigidly fastened on a tower made of poles and old lumber. With this arrangement, it was necessary to make both axles of the rear

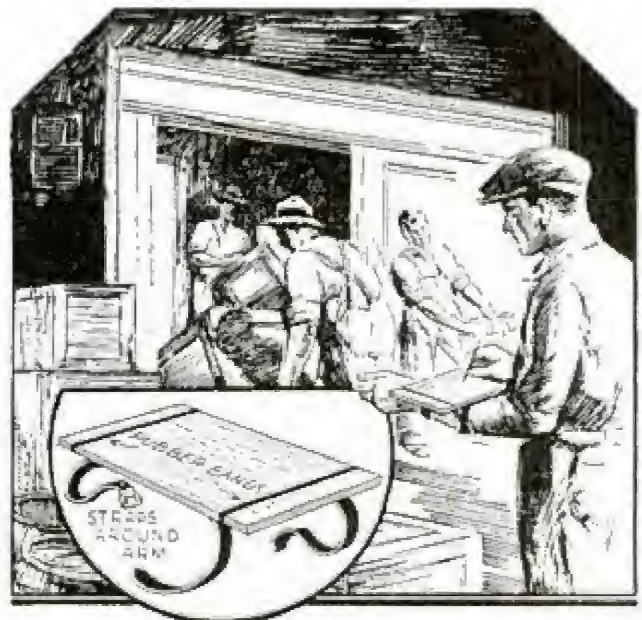


end work as one, and therefore the space between the spider gears was filled with lead to lock them. On the end of one axle, a wood pulley was keyed, this being provided with an eccentric pin to drive a wooden pitman, the lower end of which was connected to the pump.

## Checking Clerk's Writing Pad Held Conveniently on Arm

A checking clerk who was often required to give the men a hand in moving heavy boxes on a shipping platform, used a writing pad, which he strapped to his arm as shown in the drawing. This permitted him to keep loose sheets handy for checking the shipments as they were being loaded, yet help the men whenever necessary. The pad is merely a piece of light plywood fitted with straps and buckles so that it can be fastened to the forearm as shown. A heavy rubber band around the pad near each end holds loose sheets in place.

☛ If the teaspoon used for serving jelly is first dipped in clean water, the jelly will not stick to it.







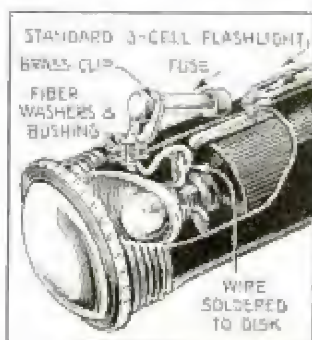
*Corrugated Cardboard Holds Cross Wires Evenly Spaced for Soldering When Making Gratings*

### Corrugated Cardboard Spaces Wires for Soldering

When making up a number of small wire gratings, a tinsmith found that a piece of corrugated cardboard was convenient to hold the cross wires while soldering them to the frame. This method made it easy to keep the cross wires parallel and equally spaced, and, instead of marking off the spacing on the frame, only the corrugations need be counted. Where a number of duplicate pieces are made, the grooves in which the wires are laid should be marked for identification at a glance.

### Flashlight Used to Test Fuses

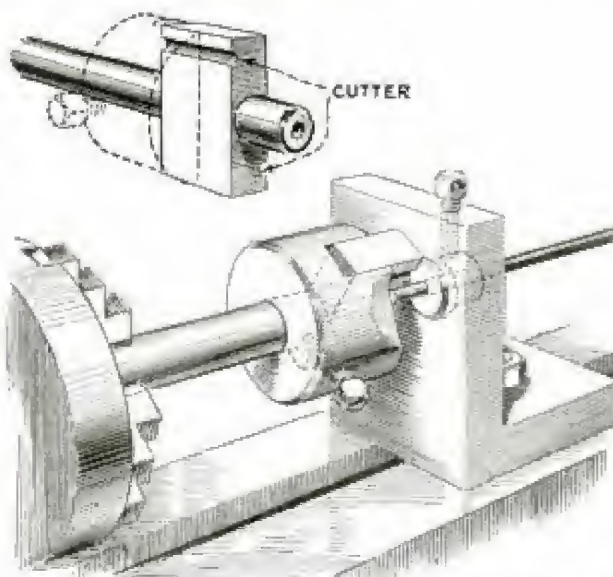
An ordinary flashlight with a clip attached to the case makes a handy fuse tester. The clip is attached near the bulb end with a small machine screw, which is insulated from the case with a fiber bushing and two fiber washers as shown. The method of wiring the clip into the flashlight circuit will depend on the type of flashlight used, the idea being to complete



the circuit by touching the fuse to the clip and to the case, which will light the bulb if the fuse is good. In the flashlight illustrated, the bared ends of a short insulated wire were soldered to the machine screw and to a metal disk, which was soldered to the bulb socket. This alteration does not interfere with the regular use of the flashlight.—R. B. Davidson, Florence, Ala.

### Pin-Cutter Attachment for Lathes

When a number of short pins or rivets of equal length are needed, they can be cut quickly in a lathe from small rods with this cutter. It is made from a flat bar of tool steel and the ends are turned down to form two projections, or shafts to carry the cutter and stop collar. The latter governs the length of the pins and is turned down from tool steel to a diameter equal to the width of the cutter. It is bored to fit the cutter shaft, where it is held with a set screw. An angle plate is center drilled on one face to take the short end of the cutter shaft and form an outboard bearing. Offset from the center on the same radius as the cutter, a second hole is drilled in the



*Pins Can Be Cut Easily in a Lathe from Small Rods with This Attachment*

angle plate to take a bushing, which holds the material to be cut. The bushing is held in place with a set screw.

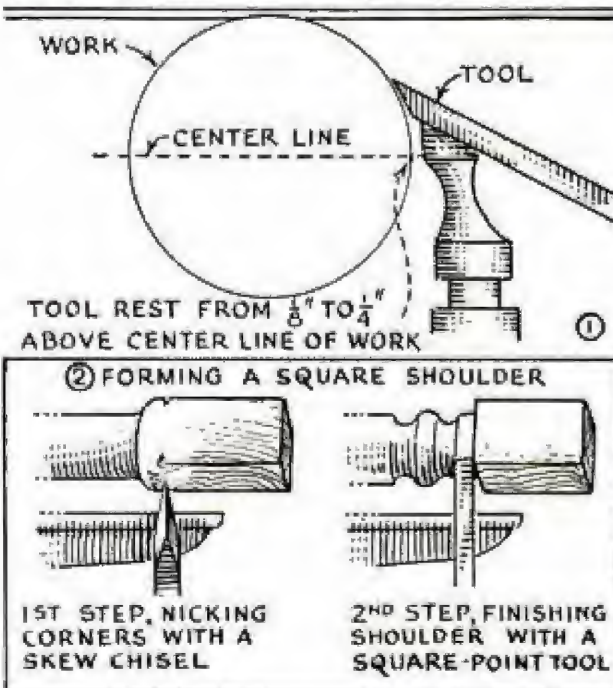
Water poured over the surface of printers' ink, after part of it has been taken from the container, will prevent the ink left in the container from drying.





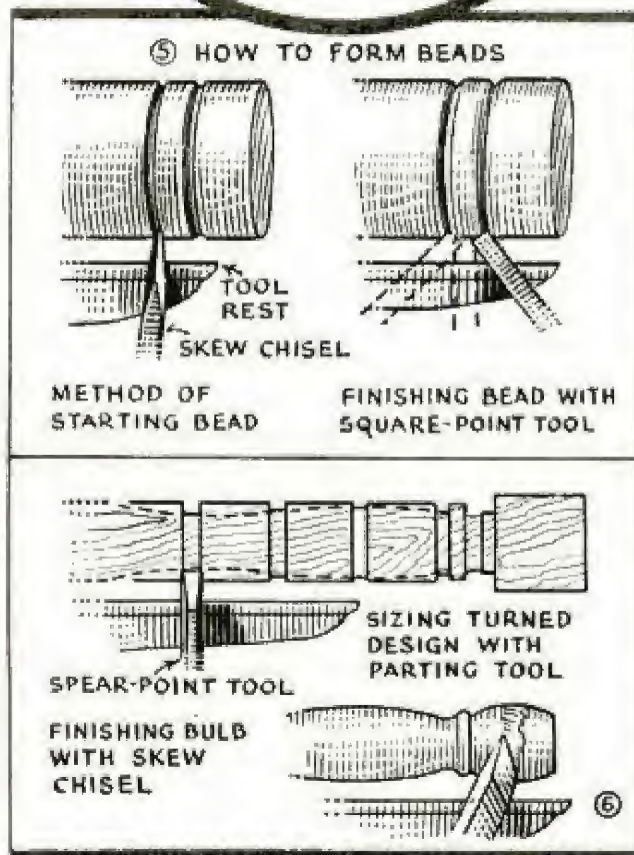
# How to Use WOOD-TURNING TOOLS

WOOD-TURNING tools are in many respects similar to hand chisels, especially the way they are handled, the cutting action being essentially the same. One of the most common faults is due to holding the tool so that its action is that of a scraper. Scraping cuts have their place in good practice on faceplate work but the tendency is to duplicate this action of the tool on work between centers by holding the handle on a line with the horizontal axis of the revolving work. Fig. 1 shows the correct tool position for cutting. The tool rest should be from  $\frac{1}{8}$  to  $\frac{1}{4}$  in. above the horizontal centerline of the work, and most important of all, the level of the tool should be held nearly tangent to the curved surface of the stock being turned. This position of the tool brings the cutting edge into action so that the chip is lifted off clean without any tendency to drag and tear the grain. However, when held at this angle, the tool is somewhat more difficult to control in close work, yet a little practice will enable you

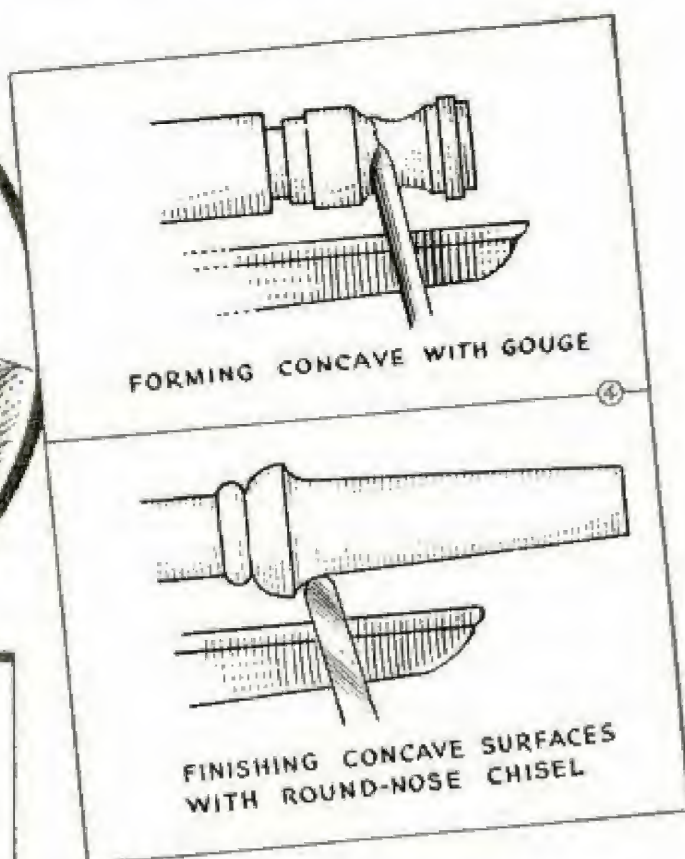


to acquire the knack in a fair degree. In turning work between centers the first operation is that of roughing the square stock into round. The gouge is always used for this as it does not tend to split





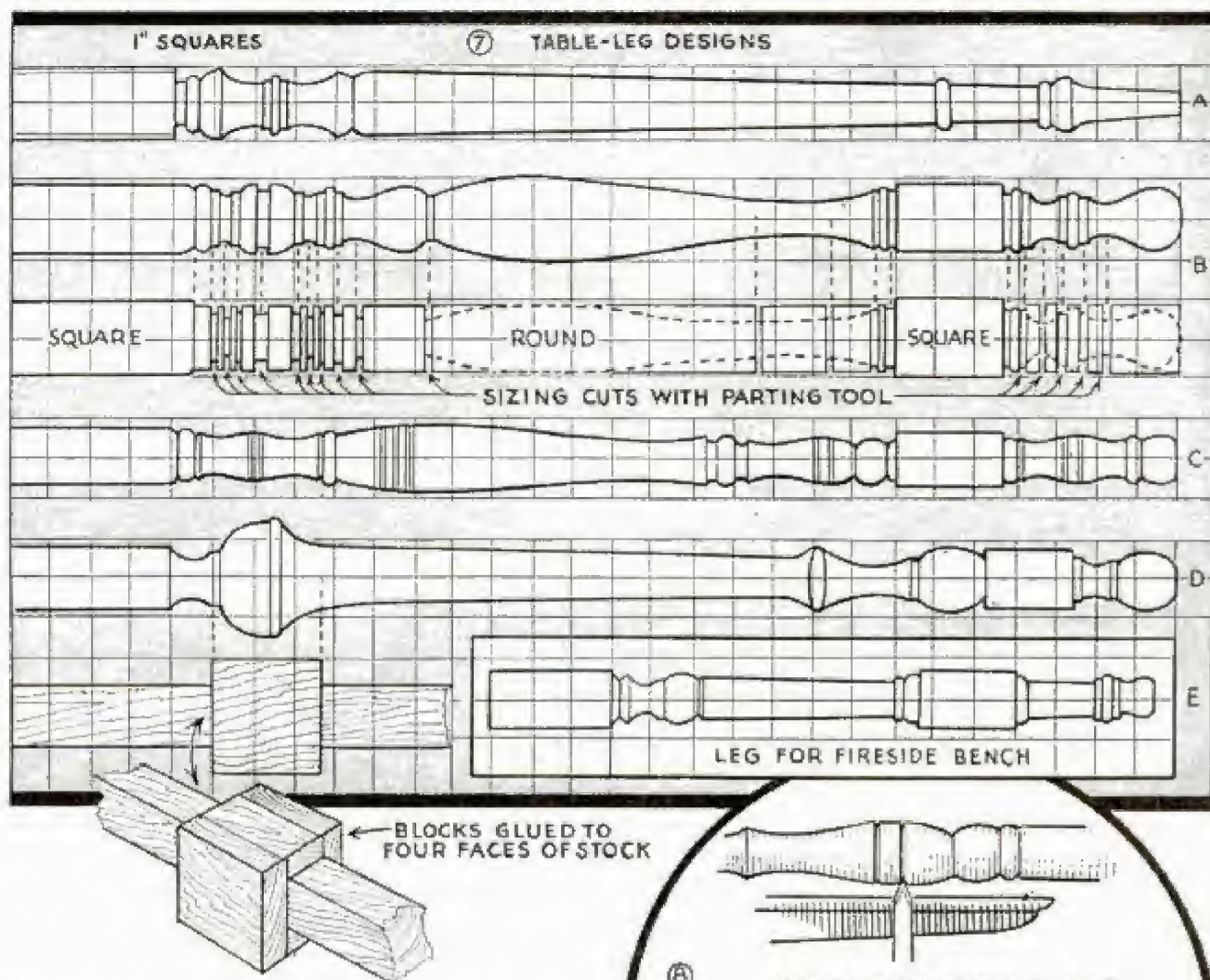
off the square corners at the start. The tool is held as shown in the circular photo, the palm of the left hand resting on the tool support and the fingers grasping the body of the tool near the point. The cut is started near the center of the work and progresses toward the right. When cutting, the blade of the tool is tilted slightly so that the chips are thrown to the side away from the worker. When the gouge is used for roughing out the work, avoid bringing the cut up to a high place for the tool is then likely to dig in and splinter



the stock. After a few cuts have been taken from the center toward the right, the worker changes his position and cuts to the left toward the headstock, alternating in this way until the work is brought to a cylindrical form. This method avoids forming a high shoulder at the center of the work. In turning table legs it is often necessary to leave a square section at one end. This may be formed by turning the gouge over and starting the cut on the corners with the tool in this position, and as it enters the wood it is slowly rolled back to bring the concave side up. This forms a rounding shoulder as a starting point for the roughing cuts on the portion that is to be turned down.

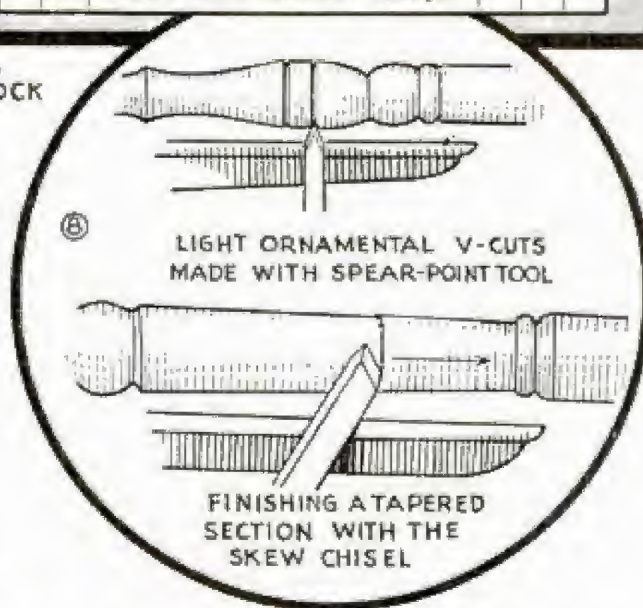
A good method of forming a square shoulder is shown in Fig. 2. The first cut is made with the skew chisel placed edge-wise on the rest with the acute angle of the bevel down. In this position the tool is run straight in to check or nick the corners of the work. Then the square-point tool is placed on the rest with one side flush with the checked corners and run straight in to remove the waste. Either the gouge or the round-point tool may be used in forming a concave as in Fig. 4. The round-point tool may be run straight in, provided the width of the groove is





greater than the width of the blade, to prevent binding. If a gouge is used to cut a concave, the blade is rolled over on the tool rest and the handle is swung slightly to the right for the first cut, which is only started sufficiently to lift the chip. In making the second cut for size, the position of the tool is reversed and as the cut progresses the blade is rolled back to the normal position. The method is used because it produces a glass-smooth surface.

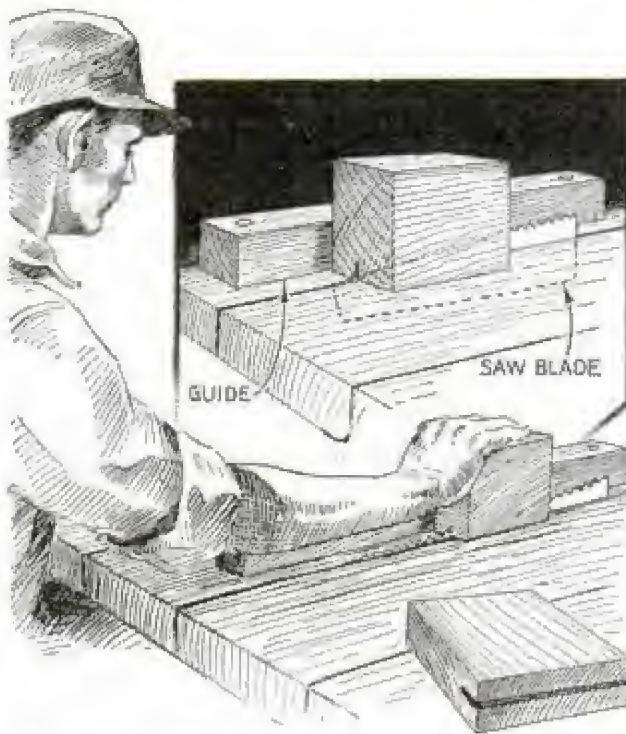
Beads are formed by making two light V-cuts with the skew chisel held on the rest as in Fig. 5, after which the bead is rounded over with the square-point tool. Wide beads and bulbs are first roughed out with the round and spear-point tools and finished with the skew chisel as in Fig. 6. When making paring cuts the skew chisel is held in the same manner as the gouge. Care must be taken when using the skew chisel on paring cuts that the point of the blade does not catch in the wood, for should this happen the tool is likely to be thrown from the hands with dangerous force. It should be noted also



that the paring cut is always started from the highest point on the work and runs downward with the grain of the wood.

To duplicate the design of a single turning it is best to lay out and size the work with the parting tool as in Fig. 3. The diameters at the grooves are calipered from the original turning, which is to be duplicated, the locations of the sizing grooves are marked on the work and the grooves are run in with the parting tool, the cut calipered as it is made. Ornamental V-cuts and tapered sections may be finished as in Fig. 8. A number of designs for turned table legs are shown in Fig. 7.





*Small Wood Blocks Slotted by Pushing Them over Teeth of Saw Blade Set in Bench Top*

### **Saw Blade Wedged in Bench Top for Slotting Small Blocks**

On a job requiring a quantity of small wood blocks in which slots were to be sawed to a uniform depth, and no circular saw being at hand, the job was done as shown. A piece of fine-tooth saw blade was wedged in a crack in a workbench top with the teeth upward, setting the blade at a slant to expose one end to the depth of the cut required. A guide strip was then nailed onto the bench at the side of the blade. By holding a block against the guide and pushing it with short strokes against the saw teeth, the slot was cut quickly.

### **Substitute for Drilling Dowel Holes in End of Small Round Work**



Instead of trying to drill an accurately centered hole in the end of small round work to take a dowel, it is easier to turn

down the end of the work to serve as the dowel. If a lathe is not available, this can be done on a circular saw. Place the end of the work on the saw table against the miter gauge as shown. Then, while hold-

ing the gauge steady, gently rotate the work against the saw blade, at the same time slowly moving it back and forth from the end to a mark previously made to indicate the desired length of the dowel.—Frank W. Bentley, Jr., Missouri Valley, Ia.

### **Fuller Ball Provides Finger Rest on a Nail Set**

If a fuller ball is forced over the tapered end of a nail set at a position where the third finger ordinarily rests, it will be found that the tool can be held more comfortably without tiring the muscles of the finger, especially when using the set for long periods.

Slight depressions may be made in the rubber to take the finger tip.



### **Pipe-Cleaning Tool Made from Stick and Bottle Caps**

For removing rust, soot or corrosion from the inside of a pipe, an efficient tool can be had by nailing bottle caps to a stick as shown. The crimped edges of the



*Corrosion in Pipe Removed with Tool Made by Nailing Bottle Caps to a Stick*

caps provide a scraping edge that will clean a pipe quickly when the tool is pulled back and forth through it with a twisting motion.



## Two Useful Suggestions for Store Keepers



Where fruit is pyramided in a window, a covering of Cellophane will help to protect it against flies during summer and frost during winter. A sheet of Cellophane rolled into a cone shape and glued to barrel hoops, as shown, will cover the fruit without detracting from its appearance. A



loop of tape at the apex of the cone permits it to be lifted.

At the right is shown how a large fishhook is wired to a bamboo pole for lifting packages off high shelves. By pulling on the pole so that the hook punctures the package, the barb will catch in the cover.

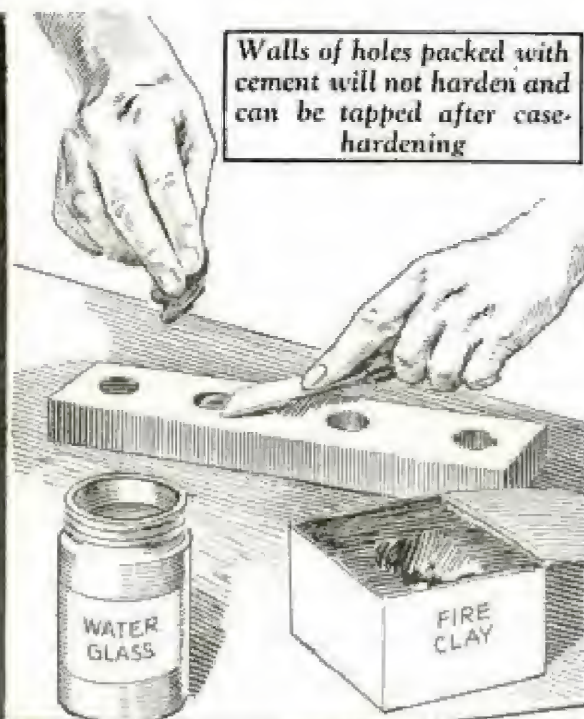
## This Self-Heating Soldering Iron Is Handy for Light Work

Using alcohol as fuel, this self-heating soldering iron will be found efficient for light work such as radio repairing. A 5-in. length of copper tubing, bent at right angles near one end and then notched as shown in the circular insert, serves as the soldering copper. After closing the notched end with a pair of pliers and threading strands of cotton wicking through the tube so that they project through a hole directly under the bent end, the tube is soldered over a hole drilled through the top surface of a small screw-top can. When the wick is lighted, the flame heats the end of the copper tube quickly.

☛ Charcoal packed around fence posts will prevent them from rotting for many years; another good treatment is to apply a paste made of linseed oil and ashes to the posts before setting them in the ground.



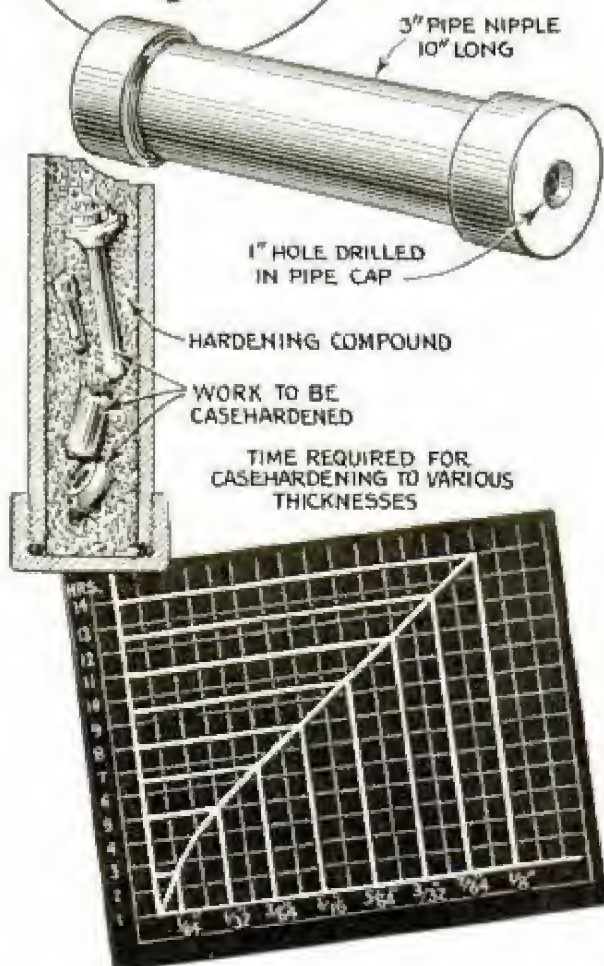




## Simple Methods to

# CASEHARDEN

By C. A. CROWLEY

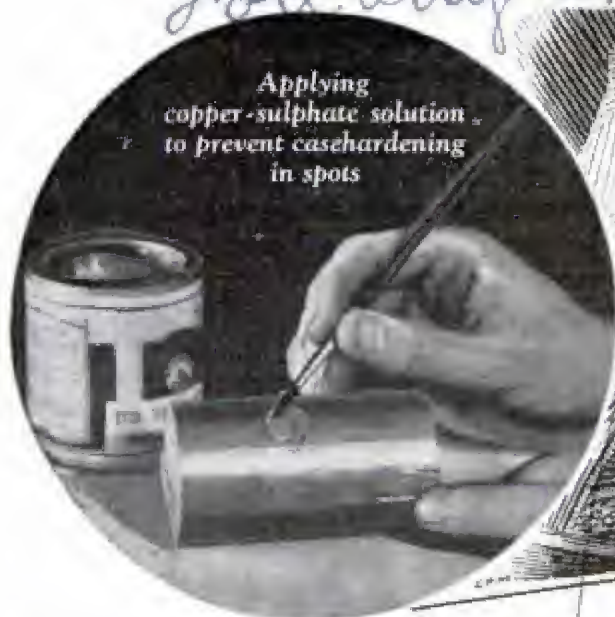


CASEHARDENING, or the process of making soft steel and iron hard on the surface, may be done by anyone. This valuable process enables the worker to make tools from as tough a grade of mild steel as he may choose and at the same time produce hardness where it is wanted without making the metal brittle. As an illustration, suppose you are making an axle shaft for a sanding machine which will have to stand severe use and accordingly must be able to resist bending and mechanical shocks and at the same time must be so hard that it will wear a long time in its bearings. For a problem like this the best thing to do would be to select a tough grade of low carbon steel and caseharden the surface to produce wearing properties. By using this process it is possible also to fashion cutting tools from soft steel, which can not be hardened by ordinary methods, and then caseharden the parts which are to be ground to a cutting edge. Where great strength is required this process offers the ideal solution as it makes possible the combination of great strength and extreme hardness in



Anti-Borax Co.  
2101 W. Wayne, Chgo.

Bell & Looseth  
C. 3000 Wallace  
Chicago



# IRON and STEEL

the same piece of metal. In casehardening, the surface of the metal is first made to absorb carbon, the element which gives steel its hardness. This is called carburization. By carburization the surface of the iron is changed into steel which may be hardened and tempered in the same manner as tool steel.

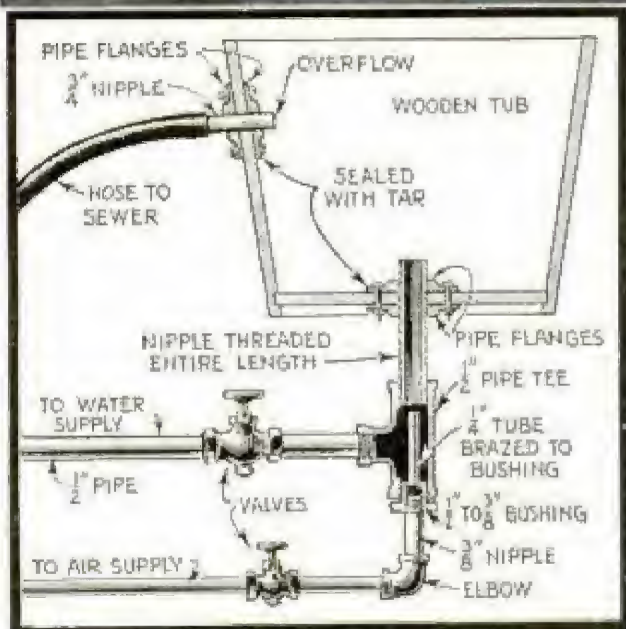
The piece to be casehardened is packed in an iron pot, completely surrounded with a carburizing compound. The compound may be purchased ready mixed from a supply house, or, if preferred, a good one may be made by mixing hardwood charcoal, 13 parts, barium carbonate, 3 parts, precipitated chalk or whiting, 1 part, and sodium carbonate or soda ash, 2 parts, all by weight. The pot may be made from a short length of gas pipe and a pair of pipe caps to fit. The dimensions shown in the drawing were selected as being convenient and may be varied to suit the work at hand. One of the caps should be put on loosely so that it may be removed easily. This cap should also be the one through the center of which a hole is drilled to serve as a vent and to permit the introduction of a thermocouple pyrometer such as was described in the November, 1934, issue of Popular Mechanics. Although a thermocouple is not absolutely



necessary for this work, it is highly convenient. In its absence temperature can be judged by color. After thoroughly cleaning the work, it is placed in the pot, care being taken to completely surround it with the compound. The work should not touch the sides of the pot.

The heating is done best in a furnace. A gas-fired furnace, which is ideally suited to this purpose was described in the November, 1932, issue of Popular Mechanics. If a forge is at hand it may be used for the heating. In this case the pot with its charge is packed into the hot coals which should completely surround the pot. In





**Quenching Tub in Which a Blast of Air Assures Rapid and Uniform Cooling of Heated Work**

either method the work is slowly brought to a bright orange temperature, or if a pyrometer is used, to a temperature of between 1,600° and 1,750° Fahr. The lower temperature should be used for small articles. When this temperature is reached the fire is adjusted carefully to hold the temperature as uniformly as possible. The accompanying chart gives the approximate time, after the work has been brought to temperature required, to produce various depths of hardening. If you are uncertain as to how thick a case you wish to produce, small pieces of metal of the same kind as the work should be inserted into the pot with the charge at the start. Re-

move one of them from time to time and quickly plunge it into cold water. These test pieces are removed easily without disturbing the charge if attached to short lengths of wire which extend through the vent hole. The hardness of the case may be tested by applying a file, and the thickness of the case checked by grinding through the case until the soft metal is reached. After heating the work the required period of time, the pot should be taken from the fire and its cap removed. The contents are then dumped quickly into a tub of cold water to harden the work. A good quenching tub, which uses a blast of air to assure rapid and uniform cooling is shown in one of the drawings. The air supply may be had from a small compressor. If air is not available, running water may be used alone provided the work is not all dumped into one spot too quickly. This method of hardening is usually satisfactory for small articles; however, for large work it is a good plan to allow the carburized work to cool in the pot without quenching in water and later to reheat to the hardening temperature and dump into the cold water as just explained.

Sometimes you may wish to harden only a portion of the surface of a job. There are several ways of accomplishing this and the method selected will depend upon the nature of the work at hand. The simplest method consists in copper-plating the parts which are not to be hardened before placing them in the pot. This is done most readily by immersing the well-cleaned work for two seconds in a dip-plating solution made by dissolving copper sulphate, 10 oz., in water, 1/2 gal. To this solution is added slowly with caution, concentrated sulphuric acid, 1 oz. This solution should be kept in a stone jar. Cleaning is accomplished by scrubbing with strong soap and washing thoroughly in clean water. The parts to be hardened should be painted with orange shellac or melted paraffin before dipping them into the plating solution. The paraffin or shellac will burn off when the work is heated and in no way interfere with the casehardening, although the copper-plated portions will not be hardened at all. The copper-plating solution also may be applied with a brush to the parts that are to remain soft. Another system in common use for preventing parts from be-



coming hardened consists in leaving spare metal, which can later be removed either by grinding or by a finish cut in the lathe. The inside of holes to be tapped after hardening may be protected from hardening by packing them full of a special cement before placing the work in the furnace. The cement is made by thoroughly mixing fire clay, 2 parts, water glass, 1 part, fine sand, 1 part, and enough water to make a sticky, dough-like cement.

### Old Auto Tires Help When Rolling Heavy Barrels

In a warehouse where heavy barrels, weighing from 300 to 500 lbs., were stored on end, but had to be tipped over so that they could be rolled to the loading platform, breakage of staves often resulted. This was avoided by slipping old auto tires over the barrels before tipping them. It was also found that when a barrel had to be rolled some distance, use of two tires lessened the risk of damaging the barrel by hitting rough places or obstacles.



*Old Auto Tires Useful in Avoiding Breakage When Handling Heavy Barrels in the Warehouse*

### Extension Shelf on Ladder Keeps Tools at Hand

Short stepladders, provided with an extension shelf, will often serve the purpose of larger ones. A plywood shelf is fastened

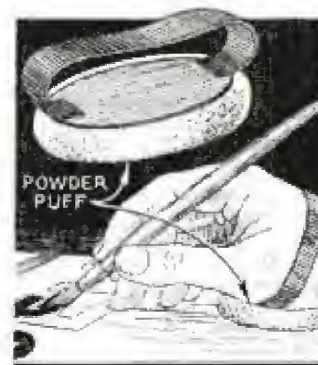


*Supported on Screw Eyes, This Extension Shelf for Small Stepladders Keeps Tools within Reach*

to a length of  $\frac{1}{4}$ -in. iron rod, bent to a U-shape so that the ends can be slipped into screw eyes driven into the front edge of the ladder rails. A slight offset bent in the rod, a couple of inches from each end, rests against the center screw eye on each side when the shelf is extended. When not in use, the rod is removed from the center screw eyes and is slipped into the lower ones in order to bring the shelf flat on the ladder top.

### Powder Puff on Show-Card Writer's Hand Prevents Soiling Work

Sewed to an elastic band, which is slipped over the wrist as shown, a powder puff will be found handy by show-card writers to prevent perspiration on the hand from soiling the work. The ball of the hand rests comfortably on the powder puff, which slides along on the work as the lettering progresses. A dusting with talcum powder at intervals will make the puff slide easily on the paper.—G. E. Hendrickson, Argyle, Wis.





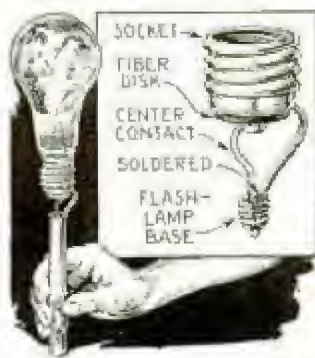


*Short Pieces of Hose on Motor Section Car Sweep Small Rocks Off Rails*

### **Sweeps on Section Car Brush Small Objects Off Rails**

To prevent his motor car from being derailed by stones thoughtlessly placed on the rails by children, a railroad track foreman made a pair of sweeps from lengths of old garden hose and attached them to the front of the car. Each sweep is held vertically just above the rails with a metal band, which is attached to a piece of angle iron bolted to the end of the car.

### **Vest-Pocket Flashlight Sets Off Photoflash Bulbs**



With the attachment shown, an ordinary vest-pocket flashlight can be used to set off photoflash bulbs. The attachment consists of the threaded part of a standard lamp socket with a wood

or fiber disk in the bottom to hold the center contact and the base of a burned-out flashlight bulb with the glass removed. The socket and lamp base are fastened together as shown in the detail by means of a stiff, brass strip, which is soldered to

them, the two center contacts being connected with a short, insulated wire. In use, the photoflash bulb is screwed into the socket, after which the attachment is substituted for the bulb in the flashlight.—W. E. Steward, Sewaren, New Jersey.

### **Substitute for Sand Blasting**

Sand-blasted finish can be simulated on the surface of metal by using emery cloth in the following manner: The abrasive side of the cloth is placed in contact with the surface to be treated, after which the back of the cloth is struck with a hammer. The intensity of the blows and the number required are dependent upon the surface effect desired. A medium grade of emery cloth is recommended. The method is especially effective on soft metal, and for producing the appearance of a cast surface on portions of a casting that have been marred or from which fins have been removed.

### **Clips Hold Chemical Graduates to Underside of Shelf**

By fastening flanged-bottom graduates to the underside of a shelf, preferably above a sink, considerable space is saved and the chances of knocking them to the floor are lessened. Clips, screwed to the shelf to hold the graduates,



consist of squares of copper, monel metal or other non-rusting material. The two opposite edges of the square are bent so that they will catch the flanged bottom. At the rear, the edge is turned down to form a stop.—Walter Burton, Akron, O.

☞ The copper sides of old cylinder-head gaskets make good shims.

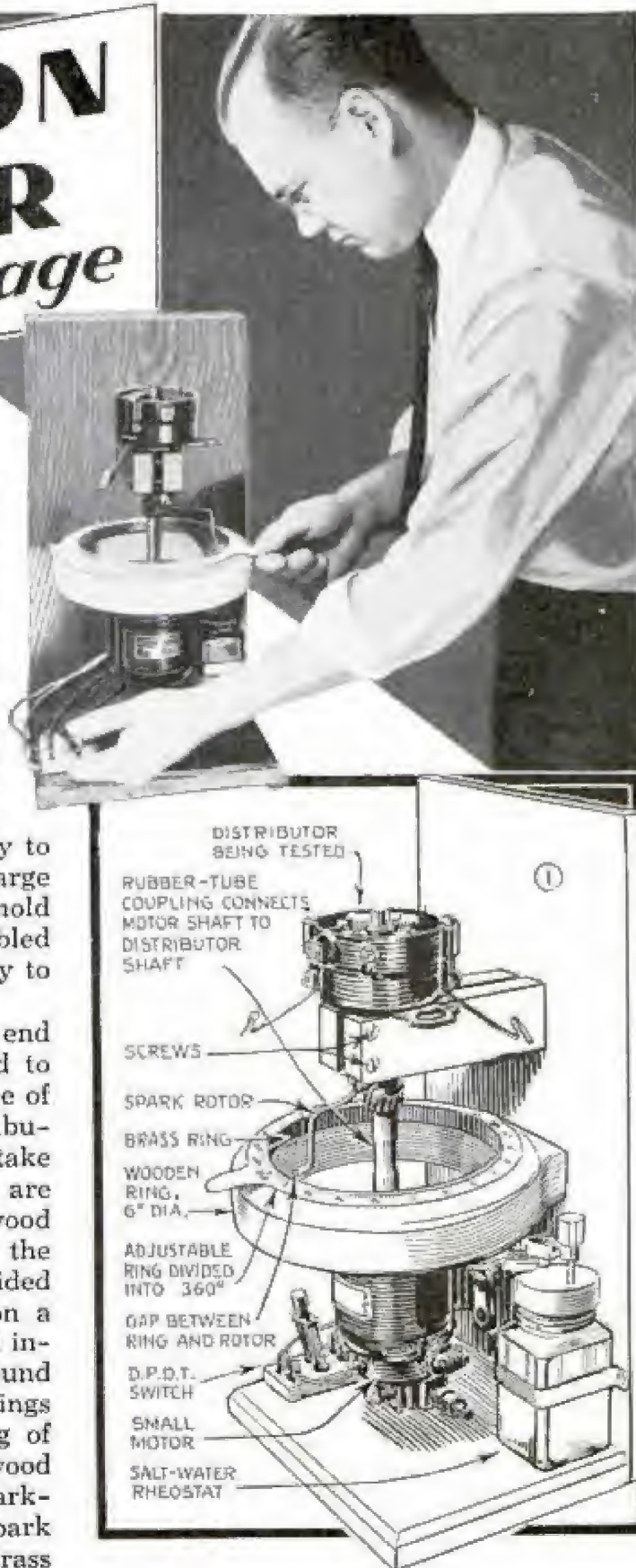


# IGNITION TESTER *for the Garage*

**M**ADE at practically no cost as the parts are available in most garages, this ignition tester will check accurately coils, condensers, distributors, and can be used for synchronizing dual sets of points in distributors. It consists of a small electric motor, such as a fan motor, to drive a distributor, which is used in making all tests, a salt-water or wire-wound rheostat to control the speed of the motor, a double-pole, double-throw switch used to run the current directly to the motor or through the rheostat, a large wooden ring and a wood support to hold the distributor, all parts being assembled on a board, which is screwed vertically to a base as shown in Fig. 1.

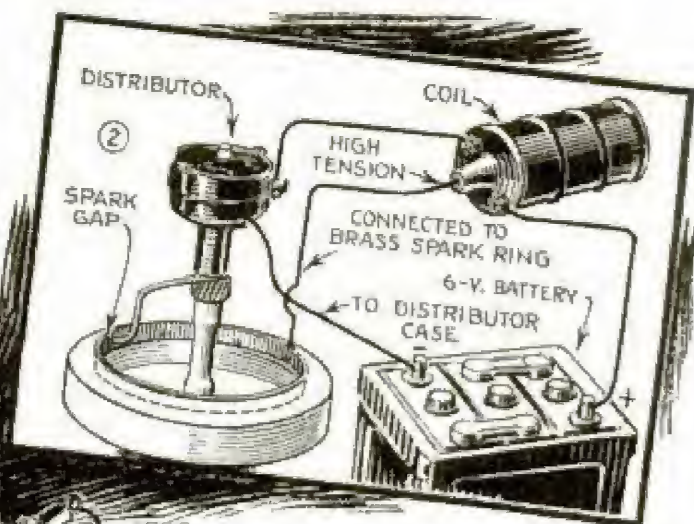
The motor is mounted with the long end of the shaft upward and is connected to the shaft of the distributor with a piece of rubber tubing. The jaws of the distributor support are grooved vertically to take the distributor-shaft housing and are clamped to the latter by means of wood screws. Between the distributor and the motor is the wooden ring which is divided into degrees. This may be turned on a lathe, and a brass spark ring mounted inside of it. In service work, it will be found convenient to have the degree markings for the spark ring on a separate ring of cardboard, which rests on top of the wood ring as shown in Fig. 1, so that the markings can be shifted to agree with the spark produced. The spark jumps from the brass ring to a rotating wire arm, which is soldered to the shaft of the motor and rotates just above the upper edge of the ring.

With the tester, trouble in the ignition system is checked by comparing the action of the suspected part with a new part of



the same type that is known to be in good condition. A coil to be tested is wired to a 6-volt storage battery and to a distributor mounted in the tester as shown in Fig. 2. The high-tension terminal of the

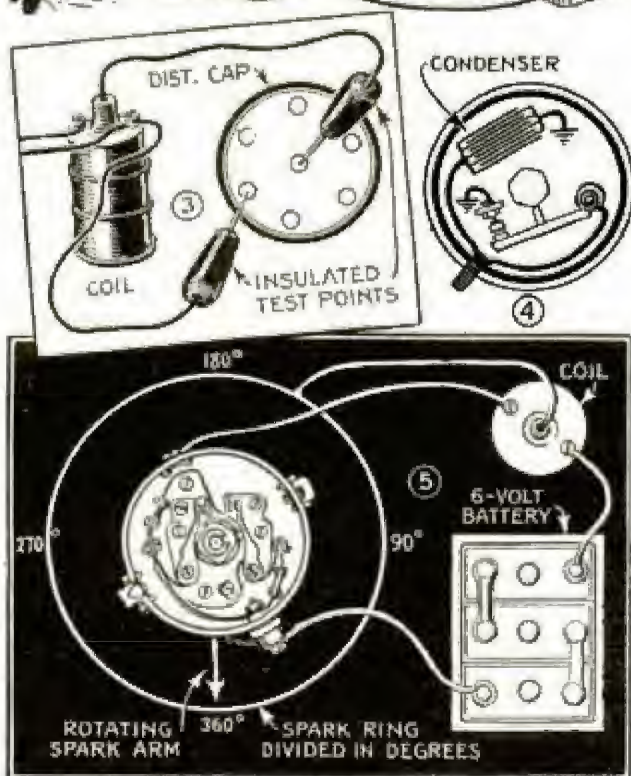




the test for at least 30 min. If there is any noticeable reduction in the intensity of the spark as the coil warms up, it is not in good condition and may cause missing at high speed or when the car motor is pulling hard on a hill.

Using well insulated test points and a coil that is in good condition, distributor caps and rotors can be checked for cracks or leaks by applying the high-tension current to opposite sides of the piece or from terminal to terminal as in Fig. 3. If there is considerable sparking at the breaker points and the secondary spark is weak, the fault is probably in the condenser, Fig. 4. With the tester wired for testing a coil, first check the regular condenser; then a new one, and note any change that takes place. This is a sure way of finding the best condenser for use with any particular coil.

Distributor testing is handled by wiring it up with a good coil, Fig. 5. Of course, the points should be clean and separated about .018 in. With the tester running at moderate speed, note the action of the spark. A double spark indicates weak springs on the point arms, which result in "point bounce." Sparks occurring at irregular intervals indicate a worn distributor shaft and bushing or a worn cam. If the sparks do not occur the right number of degrees apart for the distributor being tested, this fact will be shown by the degree markings on the brass ring. By shifting one set of points in a distributor that has two sets, they may be synchronized while the tester is running. The operation of an automatic spark control can also be checked with the tester.



coil is then connected to the brass spark ring, after which the spark gap between the rotating arm and the ring is adjusted to about  $\frac{1}{4}$  in. With this done, start the tester and note the heat and regularity of the spark. Then speed up the tester until the spark weakens and disappears. Repeat this test with a coil that is known to be in good condition and you will have a comparative check on your suspected coil. The final check to determine its suitability for continued running is to leave the coil on



### Heat Control Affects Carburetor

Thermostatic heat controls used on many automobiles to regulate the temperature of the mixture before it enters the cylinders are sometimes rather critical in their adjustment. What seemed to be too lean a mixture for good running on one car was traced to a faulty thermostat, which kept the gasoline-and-air mixture too cool.

### Mounting Super-Balloon Tires

If you have had trouble in getting a valve stem of a super-balloon tire through the hole in the rim, this kink will be of



assistance. A short length of small size chain is soldered to the end of an old valve cap, which is screwed on the end of the valve stem. It is then an easy matter to pull the stem through the hole in the rim.

### Hand-Operated Wiper Cleans Inside Surface of Windshield

By mounting a hand-operated windshield wiper so that the squeegee rubs against the inside surface of the glass, an effective means is provided for removing condensed moisture from windshields of closed cars. The wiper arm will provide a handle so that no change in the construction of a standard wiper is necessary. In



*Condensed Moisture on Inside Surface of Windshield Cleaned Off with Hand-Operated Wiper*

some cases where the construction will permit, a dual wiper arm can be fitted to the power wiper so that one blade will clean the inside of the glass.



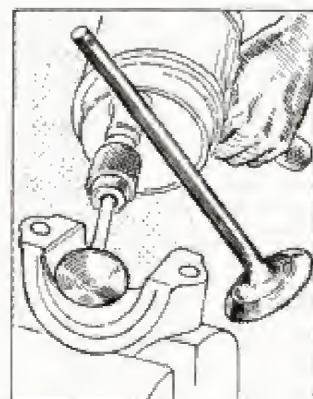
*Corrugated Iron on Floor of Shop Prevents Tacks Dropped on Floor from Puncturing Tires*

### Floor of Corrugated Iron Prevents Punctures in Repair Shop

In an auto-upholstering shop where tacks were often dropped on the floor and punctured tires if a car was driven over them before they were swept up, the shop owner laid corrugated sheet iron over the portion of the floor where the repair work was done, after which the car to be repaired was driven onto it. In this way, if any tacks were dropped, they fell into the corrugations where they did not come in contact with the tires.—G. E. Hendrickson, Argyle, Wis.

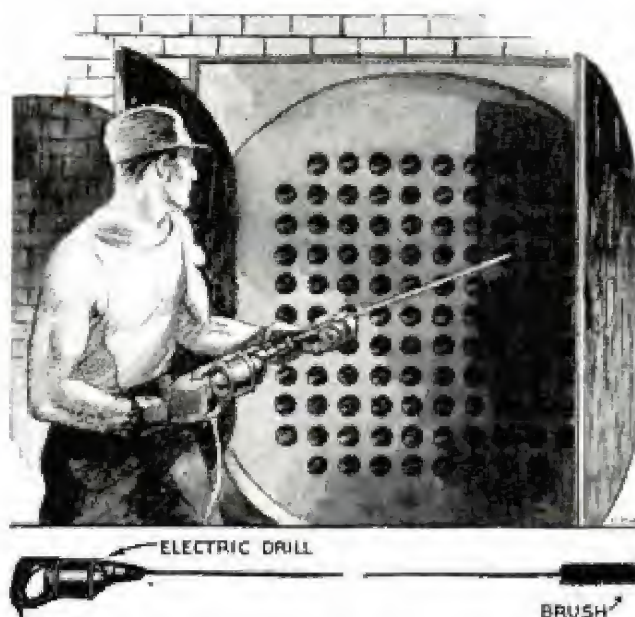
### Oil Grooves Cut with Old Valve

When a regular tool is not at hand for cutting oil grooves in re-babbitted bearings, one can be quickly improvised by filing teeth around the head of an old motor valve. When held in an electric drill, the valve works like a rotary saw and quickly grooves the babbitt lining of the bearing as shown.—W. F. Lowder, Humboldt, Ia.





### Electric Drill Helps in Cleaning Boiler Flues Quickly



*The Job of Cleaning Boiler Flues Is Made Easy by  
Using an Electric Drill*

Firemen and janitors who often have the tedious job of cleaning boiler flues, will find that much time and effort can be saved by using an electric drill to rotate the brush. The hand grip of the brush is cut off and the shank is chucked in the drill as shown. If you find that the shank is too large to fit the drill chuck, the end should be turned down to fit, which is preferable to filing.

### Waste Prevents Chatter Marks When Countersinking Holes

To prevent chatter marks in metal when countersinking holes for screw heads, place a small piece of waste rolled into a compact ball over the hole. Then bring the countersink down on the waste and start the machine. The waste packs in the flutes of the countersink and prevents chattering.—Floyd F. Holly, Stamford, Conn.

## The Next Issue

### *WINDSOR CHAIRS BUILT IN YOUR WORKSHOP*

Two outstanding examples of Windsor chairs shown in every detail. This article shows you each step in making the parts and the method of assembling, gluing and finishing this well-constructed furniture.

### **AIR COMPRESSOR RUN BY SCROLL SAW**

Simple, efficient air compressor, made mostly from wood parts, fits on the scroll-saw table and can be used for jobs such as spray-painting.

### **SHIP PLAQUES IN CARVED RELIEF**

Recessed background, which you can cut away with hand tools, gives realistic effect of bellied sails and rounded hull standing out in bold relief.

### **NOVEL WORLD-GLOBE MOUNTINGS**

Several methods of mounting your world globe; one method shows how an electric clock motor is used to make the globe rotate and tell time.

### **MAKING MONEY ON THE ICE**

Arctic tenpins, snowbird sails and other popular items that find ready rental on the ice and will bring profit to the enterprising builder.

### **USING HAND PLANES**

Expert tells what can be done with hand planes and the right way to use them in various woodworking jobs that demand care and accuracy.



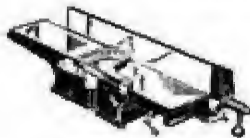
# New Drill Press

## New "DELTA" Models

### Now Complete Full Line of Modern Drill Presses

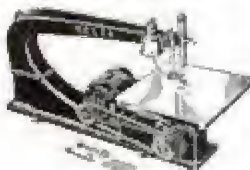
Two new "Slo-Speed" Drill Presses together with other models now makes available Delta Drills for every purpose—in home workshop and factory alike. A Delta Drill Press is almost a complete workshop in one tool. It can be used for mortising, routing, drilling, carving, sanding, shaping and surface grinding. Delta Drill Presses embody Delta "quality" throughout—and yet are priced at unusual low price levels. Send for catalog. See coupon below.

### NEW TOOLS—NEW FEATURES IN 1935 "DELTA" LINE!



#### NEW 6-INCH JOINTER

Has new Patented Fence and many unusual improvements.



#### NEW SCROLL SAW

Cuts with finest jeweler's blades at full motor speed. Many other features.

The new "Delta" Drill Presses are but two of the many new improvements and tools announced this year by Delta engineers. This year the Delta line of motor-driven woodworking tools is more complete than ever before. Delta standards of efficiency, quality and convenience have been strictly maintained—and Delta prices still kept at their low levels. Good compact motor-driven tools are within the reach of all. Every woodworker will find the new 1935 Delta line of unusual interest.

The "Delta" line includes: Jointers, Circular Saws, Band Saws, Scroll Saws, Drill Presses, Woodturning Lathes, Boring, Routing, Sanding, and Mortising Attachments—and a complete line of accessories.

### WRITE FOR

## CATALOG

The 1935 catalog of Delta quality motor-driven tools is now off the press. It is crowded with photographs and information about the new line of 1935 Delta tools. It shows how Delta tools are built to stand the grind of production work, and yet are so low priced as to be within the reach of all.

Send coupon so your name will be placed on the mailing list to receive the 1935 Delta catalog without delay. Enclose only 10c at same time for Book of Practical Delta Projects. 32 pages of new and novel things to make, with many blue prints, working drawings, photographs and illustrations—and complete directions.

**DELTA MANUFACTURING COMPANY.** Dept. A 135  
3775 N. Holton Street Milwaukee, Wisconsin



**DELTA MANUFACTURING CO.**  
Dept. A 135 3775 N. Holton St., Milwaukee, Wis.  
I enclose 10c (stamps or coin), for which please send me one copy of "Practical Delta Projects". Also place me on your mailing list to receive 1935 Delta catalog of quality motor-driven woodworking tools.

Name.....Age.....

Address.....

City.....State.....

☐ Check here if you are a Delta user now.





# TIRED OUT?...

**ACROSS HIS DESK** flows the news of the world: Ray Baker of International News Service. 70,000 miles of telegraph wires and direct cable loops with foreign countries flash 100,000 words a day to Baker...to be quickly judged and edited. He says: "The man on the INS news desk has a high-pressure job. The most enjoyable way of easing the strain that I know is smoking Camels."



**HOCKEY STAR.** "Bill" Cook says: "I smoke only Camels. Their taste sure hits the spot! I smoke a lot. Camels never get on my nerves or tire my taste."

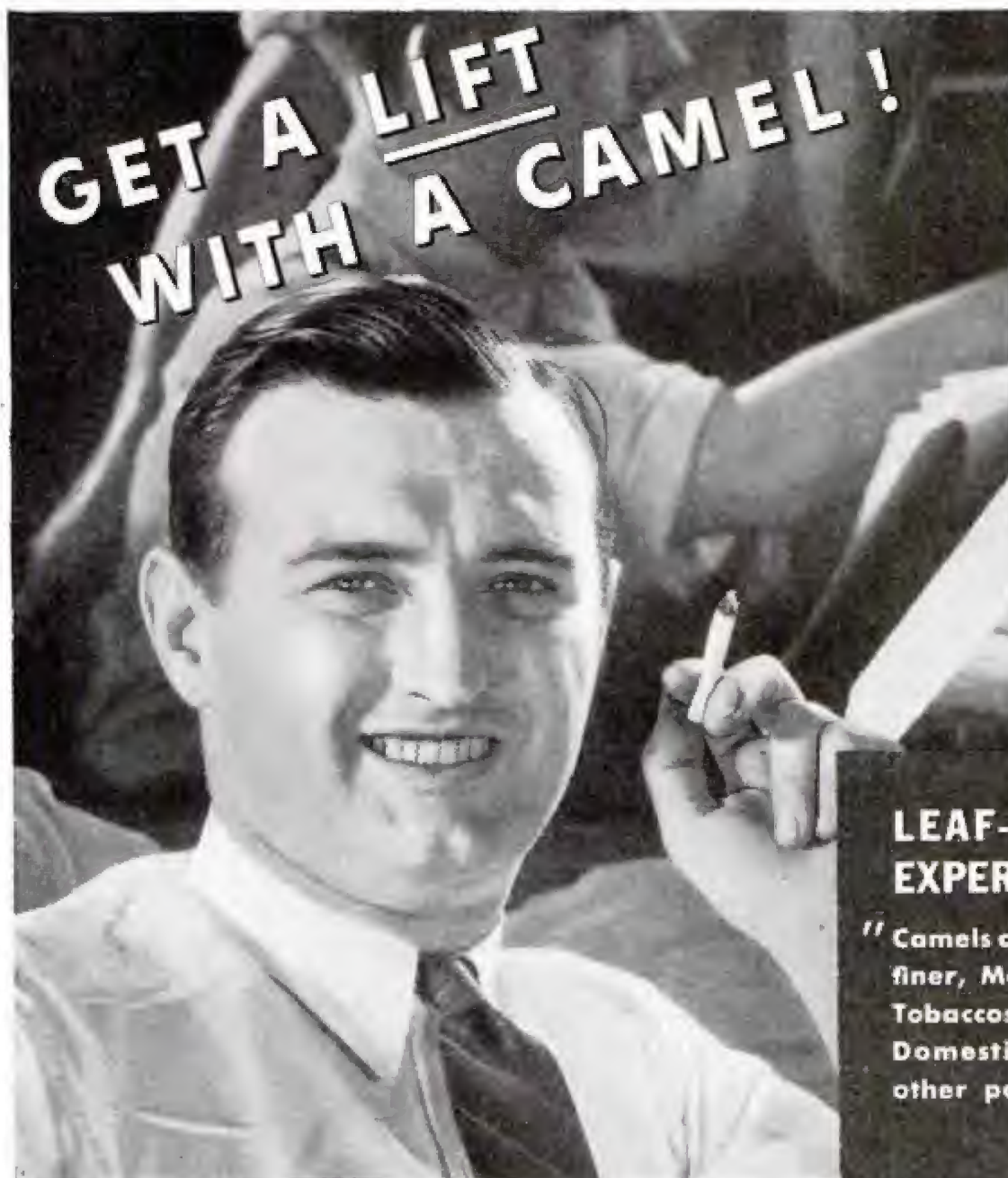


**BUSINESS GIRL.** Eve L. Miller: "I smoke Camels because I appreciate delicacy of flavor—and Camels give me a 'lift' when my energy is low."

## CAMEL'S COSTLIER TOBACCOS

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**GET A LIFT  
WITH A CAMEL!**

### LEAF-TOBACCO EXPERTS AGREE:

**"Camels are made from finer, More Expensive Tobaccos—Turkish and Domestic—than any other popular brand."**

### PERSONAL EXPERIENCES THAT POINT THE WAY TO INCREASED ENERGY!

Newspaper man—hockey star—business woman—wherever smokers are placed in life, they notice a positive energy-refreshing effect from smoking Camels when they are tired or "out of sorts." Ray Baker says: "My experience has been that whenever I feel 'all in' Camels bring back my pep, and I can tackle the next big story with renewed energy! For over ten years I've preferred Camels. They have a rich, distinctive flavor that just suits me. And I can smoke Camels continually without jangled nerves."

Science confirms the experience of smokers regarding Camel's "energizing effect." You can smoke them freely since Camel's matchless blend of costlier tobaccos never upsets the nerves!



**NEVER GET ON YOUR NERVES!**

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R. J. Reynolds  
Tobacco Company

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# Make your own Christmas card with G-E MAZDA PHOTO LAMPS



How this card was made! The tree was cut out of composition board, because a regular tree does not produce a simple silhouette. It was placed before a light colored wall with a G-E MAZDA Photo-flash lamp behind it, directed at the wall. When the pose suited, the lamp was flashed. Another method is to put a sheet over a doorway behind the subjects and to flash the lamp in back of the sheet.



G-E MAZDA  
Photoflash lamp



G-E MAZDA  
Photoflood lamp

Christmas cards are easy to make . . . and loads of fun . . . thanks to G-E MAZDA Photo lamps. These magic lamps open scores of possibilities for creating "different" cards . . . as well as for capturing happy moments the year 'round . . . through INDOOR PICTURES.

G-E MAZDA Photoflood lamps, used with super-sensitive film, enable you to take dozens of pictures at night . . . SNAPSHOTS, if you use a camera with a fast F/6.3 (or faster) lens; TIME EXPOSURES of one or two seconds, with box or slow lens folding cameras. Excellent for taking home movies.

FOR BABIES, PETS and action scenes, you need G-E MAZDA Photoflash lamps. They make such pictures as easy as snapshots in sunlight. Use them anywhere (operate on batteries or house current) with any camera which can be set for "time." Each lamp gets one picture. 15 cents list.

Your druggist or camera dealer can supply you with lamps and film. General Electric Company, Nela Park, Cleveland, Ohio.

**GENERAL  ELECTRIC  
MAZDA PHOTO LAMPS**

## COMET ON RAILS BRINGS AIR SPEED TO EARTH

(Continued from page 10)

wagon trains were organized to carry supplies into the new settlements. Freight cost ten dollars a hundred pounds to Santa Fe and twenty-five dollars per hundred to Los Angeles.

In the stage lines of 1858, a passenger with an iron constitution could undertake a trip lasting twenty-four days, and twenty-four hours each day, between St. Louis and San Francisco, for a fare ranging from \$100 to \$600. Horses and drivers were changed all along the route.

The pony express first ran in 1858 on an experimental basis. In the next year, its organization numbered 500 horses, 190 relay stations, 200 hostlers, and eighty first-class riders, including Buffalo Bill.

The fastest riders covered the 1,900 miles between St. Joe, Mo., and Sacramento in eight days, but usually the journey required ten days. What won great fame for the riders was their expertness, endurance, and reliability. Out of 650,000 miles covered, they lost only one mail. Buffalo Bill made a record of 384 miles in a single ride.

The pony express didn't last long because a new form of rapid word transit, the telegraph, came into vogue and in the midst of the Civil war, congress got the first transcontinental railroad under way, in 1863. The Union Pacific worked west from Missouri, while the Central Pacific worked east from California.

In May, 1869, the tracks were joined, a golden spike was driven into the polished tie of California laurel, and as the blows of the hammer were "broadcast" over telegraph wires attached to the rails, all the country knew that at last the Atlantic and Pacific coasts were tied by threads of steel.

Eighteen hundred miles of track had been laid through the wilderness between California and the Mississippi, ranking, after the Panama canal, as the greatest feat of American engineering. Its cost to the nation was \$830,000,000.

Barely sixty-five years have elapsed. The same distance was recently covered by Colonel Roscoe Turner in slightly more than ten hours! Of course, Colonel Turner's flight did not happen without previous preparation and experience. As recently as 1920, one of the great goals of

(Continued to page 138A)





### • KODAK SIX-16 (f.4.5)

—the camera for those who know. Snap open at the touch of a button. The Kodak Anastigmat f.4.5 lens gives greater snapshot scope . . . and the Compur shutter's 1/250 second speed "stops" most action. Has both eye-level and reflecting finders. A self timer lets you get in the picture yourself. For 2½ x 4¼ inch pictures—\$40.



• **KODAK DUO SIX-20 (f.3.5)**—a true miniature camera—yet it makes a larger, album-size picture . . . takes sixteen 1½ x 2¼ inch pictures on a roll of 620 film . . . f.3.5 Kodak Anastigmat lens . . . 1/300 second Compur shutter . . . \$52.50.

• **KODAK VOLLENDA (f.3.5)**—a fine miniature camera. Takes sixteen 1 3/16 x 1 9/16 inch pictures on a roll of "vest pocket" film. Eight-speed Compur shutter . . . f.3.5 lens . . . eye-level finder. Price—\$33.50.



# Gifts

## YOU'LL WANT TO GIVE —AND GET

• IT'S CHRISTMAS . . . Kodaks are on parade. Precision Kodaks with fine, fast lenses . . . inexpensive Kodaks for beginners . . . tiny Kodaks for miniature snapshots. Brownies as low as \$1; Kodaks, \$5 up. See them at your dealer's. Give a Kodak. ONLY EASTMAN MAKES THE KODAK



• **KODAK RECOMAR "18" (f.4.5)**—most versatile of Kodaks. With f.4.5 Kodak Anastigmat lens . . . 1/250 second Compur shutter. Double-extension bellows for close-ups . . . long-focus and wide-angle lenses may be used. Ground-glass focusing. Uses cut film, film packs or plates. For 2¼ x 3¼ inch pictures—\$46.



• **KODAK SIX-20 (f.6.3)**—styled for 1935. The f.6.3 Kodak Anastigmat lens gives clear snapshots. It opens at the touch of a button. Has 1/100 second shutter. Eye-level and reflecting finders. For 2¼ x 3¼ inch pictures—\$17.50. Other models from \$14.

### GIFTS GALORE

Send today for catalog showing all latest Kodaks. Mail this coupon to Eastman Kodak Co., Rochester, N. Y.

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Street \_\_\_\_\_ State \_\_\_\_\_  
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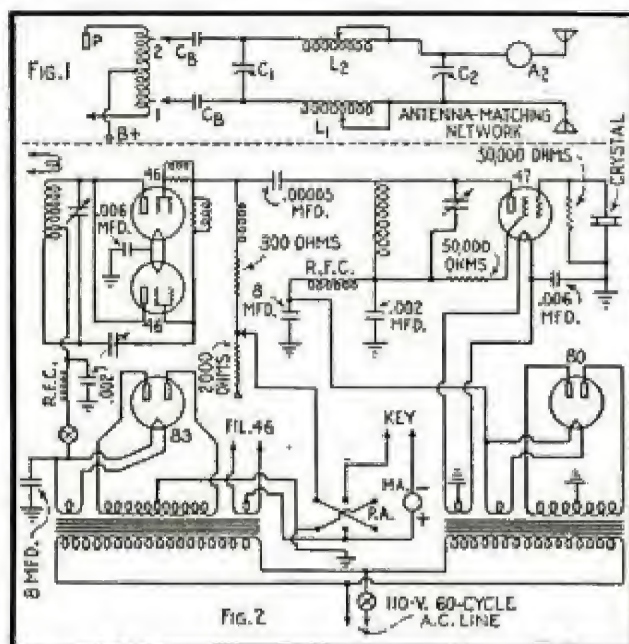
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## COMPLETE TRANSMITTER FOR BEGINNING AMATEURS

(Continued from page 101)

The lower photo shows the Collins antenna-coupling unit, for use with this transmitter, which insures maximum efficiency with practically any type of sky wire. Schematic diagrams of each unit are given in Figs. 1 and 2. Thoroughly tested in Popular Mechanics radio laboratory.



the results were highly satisfactory. Several users have reported working Mexico City, Hawaii and New Zealand.

## HOMEMADE TROUBLE LOCATOR FOR POWER UNITS

(Continued from page 104)

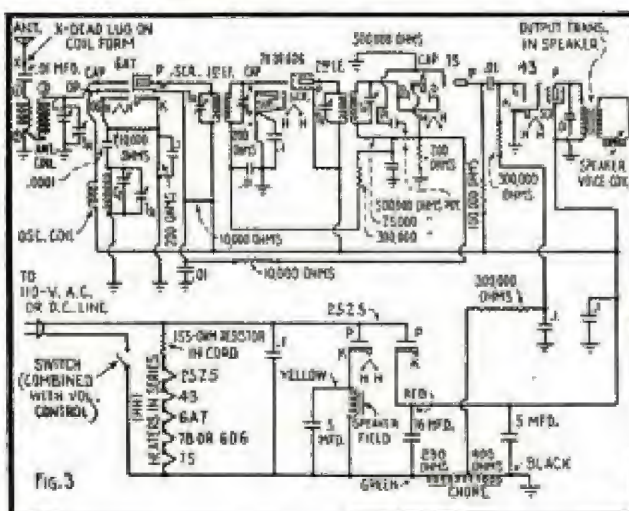
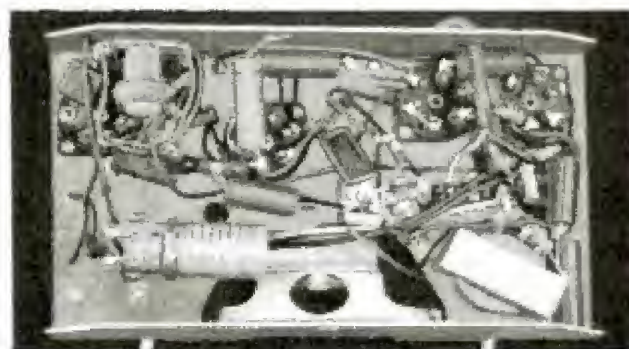
To use the device, remove the rectifier tube from the receiver and insert the adapter, placing the tube in the top section. Plug in the a.c. cord and the tube will light. The test leads are connected to an external 100 m.a. meter, the ground lead clipped to the chassis, and the receiver is then turned on. A reading of between 50 and 80 mils will be noted. Now shut off the set and remove the clip from the chassis; again turn the set on and note the meter reading. If it reads the same as before, it means that the filter condenser connected nearest the rectifier is shorted. If this reading is somewhat less, one of the other condensers is at fault. If, with the ground clip on the chassis, the reading is about 70 and when the clip is removed the reading is zero, the choke is defective.

**LITTLE GIANT FIVE-TUBE SUPER  
FOR A.C. OR D.C.**

(Continued from page 103)

tailed in Fig. 2 is for mounting the combination volume control and switch.

To avoid confusion in wiring the tube sockets, they should be mounted on the base so that the large holes for the heater terminals are in the same positions, viewed from below, as shown in Fig. 1. A complete list of materials, with additional wiring and balancing data, may be obtained upon application without charge. A schematic circuit diagram is shown in Fig.



3. An enlarged blueprint of all diagrams is available; those who wish it should specify blueprint R-205.

To balance the set, tune in a weak signal and adjust the TR. condensers, in the top of the I.F. transformers, with a small screwdriver for loudest signal. Do not turn the screws more than one complete turn in either direction. The next step is to adjust the ganged-condenser unit in the usual manner so that it will track evenly across the entire dial.

With condenser plates all out, adjust front section TR. until police calls are heard. Then rear TR. for loudest signal on any low-wave broadcast station.



# "Friction Fighters" Find New Way To Refine Oil

*that will make Millions of Cars Start Easier this Winter*

Why Mobiloil Arctic...  
made by the Socony-  
Vacuum Clearsol  
Process...makes starting  
easier...lasts longer  
...keeps cars better  
protected against Winter



SCIENTISTS WORKED ceaselessly to perfect the new Clearsol Process



THESE HUGE tanks hold materials that wash impurities from oil

**M**ILLIONS OF CAREFUL motorists right now are getting their cars ready for the hard Winter driving that's ahead.

Before you change oil—read the whole story of this remarkable new development in oil refining.

Instead of relying on filter and acid baths, as is customary, the new Socony-Vacuum Clearsol Process actually *dissolves out* the impurities in crude oil.

What happens to the oil is amazing. It is practically 100% pure lubricant. When you put it in your engine, you discover these things:

**FIRST**—Mobiloil Arctic made by this new process makes starting much easier in cold weather.

**SECOND**—Mobiloil Arctic made this way lasts as much as 25% longer.

**THIRD**—Engines stay cleaner—you'll have no gummed rings or stuck valves as a result of using this oil.

Now is the time to get your car in shape for hard Winter driving. Go to the nearest Mobiloil dealer—you'll know him by the Mobiloil sign with the red Gargoyle or the sign of the Flying Red Horse... and refill with clean Mobiloil Arctic. Act now. Socony-Vacuum Oil Company, Inc.



Below — The same engine, used in two tests, was first run with ordinary oil (upper picture). The lower picture shows how much cleaner engines stay when you use this new type Mobiloil Arctic.

**FOURTH**—Mobiloil Arctic holds its body at high temperatures, and guards your engine against wear, no matter how hot it gets.

With these many advantages, you might well expect this marvelous new Mobiloil Arctic to cost more. But it doesn't. The price per quart has not been advanced one single cent.



# Mobiloil Arctic

MADE BY THE NEW SOCONY-VACUUM CLEAROSOL PROCESS





## IS YOUR DRIVING 'TOUCH' MODERN?

(Continued from page 68)

course. Much of the trouble experienced with the new cars is due to motorists trying to "drive" them. That's wrong. The new cars require "guiding." They operate more effectively with restraint on the part of the driver.

Maximum braking force should be applied after the car's speed has been brought down to safer limits. If the car is brought to a stop within 160 feet from a speed of sixty miles per hour, and weighs 3,500 pounds including load, it develops 280 horsepower. This power would be sufficient to throw the car 120 feet into the air. If, however, the driver slows down moderately until the car drops to a speed of thirty miles per hour, and then makes an efficient stop within forty feet, the horsepower developed is reduced to 140 and the car could be thrown into the air only thirty feet by reason of this power.

Handling "knee-action" cars calls for special ability not acquired by experience with yesterday's automobiles. Since there are several designs of independent front springing in service, methods of handling differ. Also there is no general agreement among drivers as to what methods are best for the handling of any one type of knee action, with the possible exception that cars with this feature take curves better when "nosed" around the turns. Skillful drivers are able to "gun" knee-action cars around curves, stepping on the gas at exactly the right moment to produce a safe and effective swing of the tail, but the average driver will fare better if he takes curves at his usual gait and watches his steering. Special care must be taken to see that the steering wheel does not spin to the straight-ahead position too suddenly. Modern drivers "brake" the steering wheel by applying finger pressure against the rim as they are going out of a turn.

These large tires do not, as many drivers suppose, give greater security in case the car goes off into the soft shoulder. They produce a terrific drag when leaving the hard surface. For that reason it is highly dangerous to try to return to the hard-surfaced portion of the road immediately. Cling to the wheel and let the car lose speed. Continue in the rough until you are sure you can cut back to the road without a bad skid.

Many of the new cars have clutches that do not engage until the pedal is well up. Because of this arrangement the driver should not rest his foot on the pedal when the clutch is engaged. He should avoid nervous tension against the pedal, especially when accelerating in the lower gears. Recently there have been quite a few cases of drivers having difficulty backing up hill. It was found they did not let the clutch pedal come up far enough for the clutch plates to take hold.

Complaints of clutch chattering have been traced to tardiness in engaging the clutch and in accelerating the motor. To engage a modern clutch too slowly, while at the same time not feeding enough gas to start the car with deliberation, simply forces the clutch plates to chatter. Modern cars are actually "cushioned" for a more abrupt start.

Never before has it been more important to handle the accelerator pedal carefully. Excessive wear on the gears, universals, rear end and tires is the penalty for ignoring this point. Sudden throttle closing causes high vacuum in the cylinders, wastes oil and makes carbon. At the same time the fuel pump overfeeds the carburetor.

Motorists who have not broken in a new car in several years will find it well to scrap the idea of holding to a steady gait of around twenty-five miles per hour during the first 500 to 1,000 miles. The ideal plan is to drive twenty-five miles per hour for a few minutes, then switch to thirty-five or forty for a short spurt. If not overdone, some reasonably fast city traffic is not a bad environment for the new car.

Be prepared for a front tire blowout by having a firm grasp on the wheel. Twist the thumb of at least one hand over a wheel spoke so there will be less chance of the rim slipping through your hands. There is a big drop when a balloon tire goes flat and a terrific drag to be overcome. Watch speed in the lower and now silent gears. Consider the high rate of compression deceleration when the throttle is closed after reaching a high speed in low or second. There is also a good possibility of backing up too swiftly with a car that is also quiet in reverse.

If the new car is to be a complete success it must be treated to new-era driving free from old-car complexes.



# FOR CHRISTMAS

## GIVE YOURSELF THIS NEW GENERAL ELECTRIC COMPLETE WORKSHOP

**No belts • No pulleys • Six machines in one, instantly interchangeable • Nothing else to buy**

Never before have so many practical working features been included in a motorized workshop. Every attachment is driven directly from the G-E motor. No frictional power losses or vibration to interfere with accurate work. Compact but sturdy, reinforced steel cabinet gives firm support.

### SIX MACHINES IN ONE

(1) Circular saw with all adjustments, (2) Jig saw, (3) Sabre saw for wood and metal work, (4) Nine-inch lathe and two wood-working tools, (5) Right-inch sander and sanding table, (6) Drill chuck with set of nine drills, General Electric quality throughout.

See It At  
Your G-E  
Refrigerator  
Dealer's

### COMPLETE . . . ECONOMICAL . . . ACCURATE

**Y**OU are through buying when you get this complete outfit. Motor, bench, and all tools come with it. Made for the professional or amateur woodworker, the small shop or the home craftsman. Equally efficient for all, because the vast resources of General Electric Company contributed to its painstaking development. Look at that motor. Though compact, it is a high-efficiency ball-bearing motor with  $\frac{3}{4}$ " shaft reduced to  $\frac{5}{8}$ " at the bearings. Ample power at the cutting edge is assured by the powerful torque of the motor and the inertia of its armature.

Surprisingly low current consumption cuts down operating cost to a level never before achieved.

Imagine—a complete power workshop which takes a floor space of only 15 by 38 inches! When you see it demonstrated—at your nearest G-E refrigerator dealer's—you will marvel at its completeness, its all-round efficiency, its practical working features, its ruggedness—and, with all these things, its amazingly low price.

## FREE!

### MAIL COUPON BELOW

for illustrated book with full story of G-E WORKSHOP



### COMPLETE G-E WORKSHOP

Motor Bench Tools **\$10<sup>00</sup>** DOWN  
Balance in Easy Payments

General Electric Company  
Nela Park, Dept. PM 1  
Cleveland, Ohio

Please send me FREE your book describing complete G-E WORKSHOP.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
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**COMBINATION SABRE AND JIG SAW**, for wood or metal. Table tilts 45°. Self-aligning overhead arm quickly secured by single bolt. Saw chuck holds machine files with round shanks up to  $\frac{1}{4}$ -inch diameter, greatly increasing wide scope of machine. Sabre saw can be attached in 6 seconds.

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**QUICK CHANGE ATTACHMENT CLAMP** makes the attachment of the sanding table, sabre or jig saw and tool post a matter of a few seconds. Construction is rigid and easily adjustable.

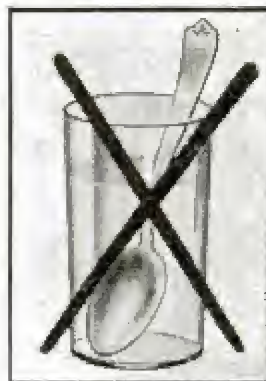
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## BRITAIN BIDS FOR ATLANTIC BLUE RIBBON

(Continued from page 79)

communications system. The "Queen Mary" has a siren voice that will carry from ten to fifty miles. The tone will be two octaves lower than middle "A," and will have a soft mellowness that will not shock passengers or prove unmusical to the ear. The 140-ton rudder can be entered through either of two doors. Inside is enough room for several men to move around.

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The ship's running costs will mount into millions every year. Can enough passengers be lured to fill all the available accommodations? Many factors will decide that ultimately.

## THE RACE HORSE DOPE RACKET

(Continued from page 83)

and morphine are not greatly favored by the dopesters. Their tendency is to make a horse more or less unruly. Heroin is milder and produces those illusions of grandeur so necessary to big running. Where a horse is sulky, only heroin alone is used. He has enough heart and strength to carry himself through the race without the artificial stimulus.

After horses have been doped for a considerable period they, like humans, become dope addicts. They cannot perform unless they have been given a "shot" before they enter a race. "Hopheads" they are called and every now and then one drops dead in the midst of a race. Horses are also given dope to make them lose races. Chloral hydrate, given in a milk solution to prevent the burning of the animal's throat, makes the animal groggy. The most fiendish method of obtaining this end, however, is the insertion into the nostrils of a racer of a sponge. Aside from its cruelty, doping inflicts injury on the racing stock of the country. Mares and sires that have been doped cannot produce healthy offspring.



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## WASTE OR PROGRESS?

(Continued from page 38)

hours. These facts have given rise to the charge that the government is overdoing hydroelectrical development. The charge of wasteful water power promotion is made.

However, not all the dams are being built for power alone. TVA and Boulder dams are essentially power plants, designed to serve certain areas with cheap hydroelectrical power. Grand Coulee might also be placed in this category. Fort Peck and Bonneville are essentially stream-control dams. Boulder dam also takes into consideration stream control for irrigation.

The great Fort Peck dam will enable engineers to control the flow of the Missouri river for its entire length. It will make it possible to maintain a nine-foot channel in the Mississippi from Missouri to the Ohio. This channel, government engineers point out, should lower transportation costs by fifty per cent as compared with a six-foot channel. It should reduce channel maintenance north of Cairo by about \$500,000 annually; cut property loss from floods by \$2,000,000 annually and result in a \$35,000,000 ultimate power value to the middle west. Flood erosion between Kansas City and Sioux City should be lessened, they assert, and an adequate water supply be assured to 2,000,000 people.

Boulder dam, in addition to furnishing the people of Arizona, Nevada and California with electrical power, will impound the surplus waters of the Colorado river for irrigation purposes. The dam will also regulate the flow of the river so as to improve navigation and protect the lands in the valleys adjacent from overflow, water shortage and silt accumulation.

The Bonneville dam will provide a nine-foot navigation channel from Portland to the Dalles, rich agricultural region in central Oregon, a distance of forty-four miles.

The government has in mind with these great power plants to serve great sections of the United States with cheap electrical power, to furnish "yardsticks" by which power production costs in private and public utility plants can be measured and to open up for exploitation hitherto unexploited areas of our national domain.

The Tennessee Valley project has an additional humanitarian angle—that of enlarging the social and economic outlook of thousands of folk in the valley.



# Easy to Play

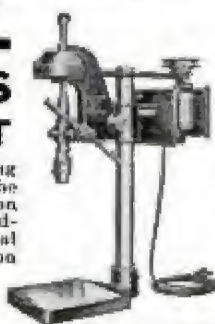
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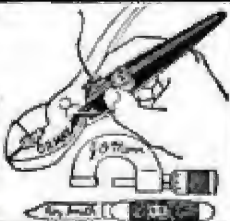
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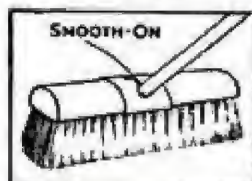
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## MOVIE MAGIC IN THE MAKING

(Continued from Roto Section)

inside and outside the studios are trying to impart a three-dimensional quality to the screen and now they think that success is not far off.

About 275 professions, arts and crafts are represented among the 30,000 employees who work behind the scenes in Hollywood. The jobs range from gardeners and members of "swing gangs," who do general roustabout work, up to the directors and stars themselves. The studios have work for school teachers who coach juveniles between scenes, for hospital attendants in the emergency hospitals on each lot, for writers in the scenario and publicity departments, and for architects and draftsmen in the set designing departments.

Each studio employs fashion designers and costume makers, location men whose work it is to spot likely places for location trips, model makers, blacksmiths, carpenters, painters, and plaster casters who manufacture the lifelike sets, librarians and research workers who authenticate costumes and furnishings for period plays, musicians for the studio bands and orchestras, hair dressers, truck drivers, stenographers, and scores of others.

In the technical trades there are film laboratory workers who develop and print the films in automatic machines, chemists and engineers who produce rainstorms, fogs, and other effects on demand, electricians for construction and operation, film projectionists, and the sound engineers and their crews. At the top of the heap are the head cameramen, the make-up artists, and the directors. Salaries of several thousand dollars a month are not uncommon here.

How does one obtain a "behind the scenes" job in films? One of the best ways is to gain experience in a particular trade and then await an opening. Once on the studio payroll there may be an opportunity for advancement or a chance to switch to another department. Property boys who move furniture around the sets sometimes graduate to set dressers and film cutters and editors may become directors or assistant directors. Another way is first to obtain a lower paid job with one of the small companies. The big drawback is that there are four or five people in Hollywood for every available job.



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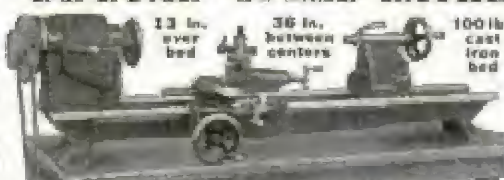
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## THE LURE OF PUZZLE INVENTING

01229

(Continued from page 23)

Puzzle solving, like puzzle inventing, involves a certain approach, without which the puzzler wanders aimlessly about, growing more irritable by the minute.

"Concentrate and speculate but, above all, calculate," was Sam Loyd's advice. "Aimless trials befores the issue."

Alertness and clear thinking are essential to the puzzle solver who is expert at the game. These are the reasons why puzzles are regularly used in intelligence tests. Called the most universal of all pastimes, puzzle solving was termed by Sam Loyd as "a gymnasium for the exercise of wits."

Children are the greatest puzzle fans in the world, because their natural curiosity draws them to problems of all sorts. Since, as Sam Loyd said, "native cleverness will often outstrip academic training in puzzle solving," bright children are a fair match for adult puzzlers, especially since the best specimens are not always those which involve complex mathematical gyrations, but rather elementary principles.

A psychologist has analyzed both puzzle inventor and puzzle solver in this manner: "There is probably in the proponent of the puzzle the unconscious or sub-conscious desire to perplex his friends and by confounding them, perhaps to establish his own superiority. And the solver on his part is not willing to admit that he is beaten and likes to feel that he is as cunning as his neighbor."

The history of puzzles has been traced back to the Egyptians, the Chinese and other sources of great antiquity, but it was not until the early seventeenth century that there appeared a puzzle maker as we understand one today. His name was Niccolò Fontana, of Italy, commonly known as "The Stammerer," and some of the puzzles contained in the book he published in 1606 are still favorites in our own day.

Jig-saw puzzles date back to the ancient Egyptians, but that did not prevent them from becoming the rage a while ago when fans in the United States absorbed a total of more than 100,000,000 of these puzzles during a seven-month period. The movement was started by the Einson-Freeman company, of Long Island City, when a business house asked for an idea to further its sales. The jig-saw puzzles

(Continued to page 130A)



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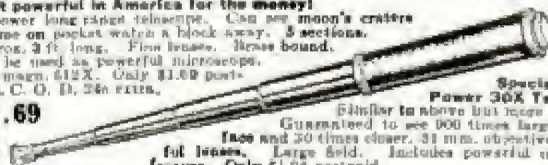
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**THE LURE OF PUZZLE INVENTING***(Continued from page 128A)*

suggested boosted the client's business 400 per cent and started the fad which took the jig-saw puzzle out of the "give-away" class into the commodity category.

The cross-word puzzle seems to be with us to stay. It has survived through many seasons and has become so popular that entire books full of them are sold, a total of more than a million copies of these having been sold in this country since they were introduced in 1924. The effect on the sale of dictionaries has been very marked, and newspapers which have added the cross-word puzzles to their regular features account it one of their most popular.

The puzzle inventing field is as much the province of the amateur as any other hobby, with the added advantage that he may strike something that will put him in clover for life. National advertisers are continually searching for new puzzles and games to use for premiums and it is to the amateur that they look for that sensational new idea that will sweep the country.

**THE RETURN OF THE "BIKES"***D 1270 (Continued from page 64)*

thirds the normal gear ratio. Another company offers a single cylinder, air-cooled motor which fits back of the saddle on any make of bicycle and permits the rider to attain rates of speed ranging from a crawl to twenty-eight miles per hour. It is estimated that one can travel on a bicycle so equipped for a distance of 500 miles without paying more than a dollar for fuel. Other "gadgets" are a speedometer which shows both the speed at which the bicycle is traveling and the total mileage covered, a streamlined saddle, balloon tires, rims of chrome-plated steel in place of wood, a combination headlamp and horn unit, the lamp equipped with an automotive type lens, and a "pencil-type" tire gauge.

With increased interest in bicycling has come renewal of cycling tours. In three transcontinental bicycle tours recently completed six days were cut from the time made in 1896, but credit for this accomplishment is given to better roads and improvements in equipment rather than increased speed.

(Photographs for this article were supplied by courtesy of the New Departure Manufacturing Co.; Delta Electric Co.; Westfield Manufacturing Co.; the Colson Co., and V. Herriek and Co.)

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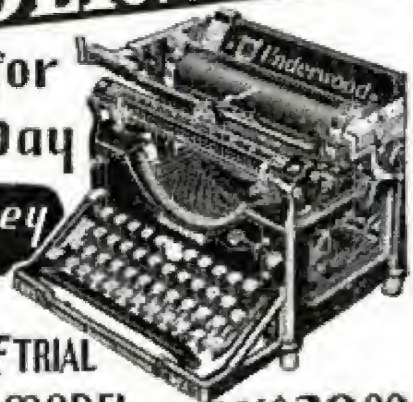
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(Continued from page 46)

smoking lounge, recreation rooms, tubs and showers, library, movies, and practically every comfort found on small de luxe steamers.

"The 'Atlantic Clipper,' as we have named the new flying boat, will have a cruising range of 4,000 to 4,500 miles. Of course, if fueling stops can be arranged every 2,000 miles or so, it will allow the vessel to increase her pay load considerably. On the oceanic route between the United States and South America, for instance, the new clipper will have accommodations for 100 passengers."

The American preference for monoplanes and their wonderful record for airworthiness has prompted Sikorsky to specify a single wing for his newest undertaking. The wing will be four to five feet thick and the span will be about 175 feet. Inside there will be ample storage space not only for fuel, but for passenger baggage, mail, express and a large number of auxiliary mechanisms. The passengers and crew will have quarters in the giant boat hull, which will measure eighteen feet from port to starboard and more than 100 feet from stem to stern.

"Notwithstanding these unusual dimensions," said the designer, "the exterior of the 'Atlantic Clipper' will resemble the present Brazilian Clipper. We are making important engineering improvements in the power plants and in details of navigation and interior equipment, but in general outline she will resemble the 'S-42'."

The engineering specifications of the "Atlantic Clipper" call for electrically and hydraulically controlled high-lifting wing flaps, variable-pitch propellers and superchargers. The 1,000-horsepower engines will also establish a record for transports. The present Pratt and Whitney Twin Wasp rates 900 horsepower, but improvements now under way will bring the rating up to 1,000 horsepower.

What of the practicability of navigating huge transports in the stratosphere?

"I believe," said Sikorsky, "that 20,000 feet is an all-around efficient altitude for long-distance passenger vessels. At 20,000 feet, we do not have to seal the apertures and the ship can have large windows and

(Continued to page 136A)



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No more "dead" batteries . . . use all the "juice" you want for car radio, heater, defroster and other accessories. Install the new K R W Auto-Charger and insure positive zero-weather starting. Plugs into any light socket and charges while your car is idle. Fits ALL cars; installs neatly beneath dash with one drill hole. May also be installed in garage for charging battery without removal from car. K R W Charger has many exclusive features: operates on both 25 and 60 cycles; 50% larger transformer yet uses only 50 watts; patented Thermal Relay prevents current flow-back if power fails; two charging rates, 2 and 5 amps., with automatic safeguard against overcharge. No liquids, bulbs or moving parts—simple, compact, complete . . . and unconditionally guaranteed for one year. Order today or write for circular.

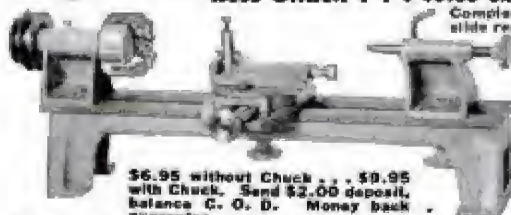
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**A PRECISION TOOL**  
Less Chuck . . . \$3.00 extra for Chuck



\$6.95 without Chuck . . . \$9.95 with Chuck. Send \$2.00 deposit, balance C. O. D. Money back guaranteed.

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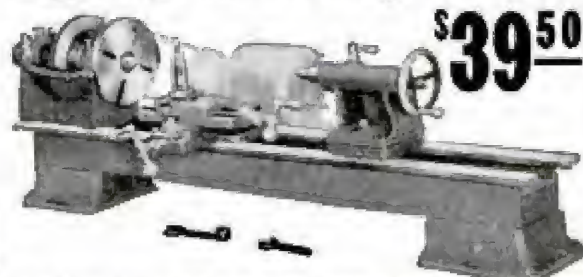


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Start at once making money with our unique sales plan. Write for full information how you can secure any or all of these plans.  
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Here's a lathe that meets every need economically. As your shop grows, you can add to it UNIT by UNIT until you have a fully equipped, back-geared screw-cutting lathe, capable of every kind of lathe work—as fine a tool as a man could wish for.

This first step has a precision-ground bed of heavy ribbed cast iron; hollow headstock spindle; tallstock; compound rest; driving belts and pulleys, etc. Takes 24 in. work between centers and has 10 in. swing.



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By adding countershaft assembly you get greatly increased power and wider speed selection. Ideal for all small metal jobs and work on radio, structures, valves, pistons, etc.



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**3**

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All lathes sold on 2 weeks' trial, money back guarantee. Full line of attachments at reduced prices.

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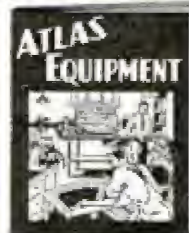
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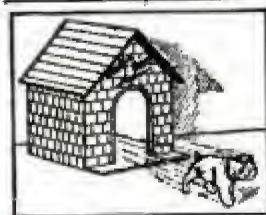
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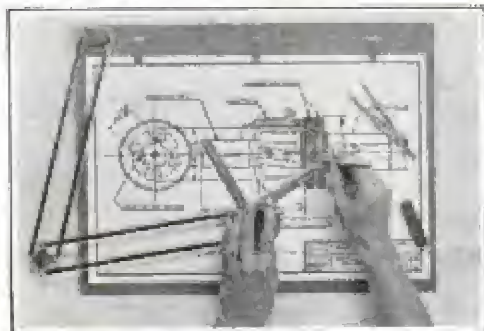
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## SIKORSKY SEES DAWN-TO-DUSK TRANS-ATLANTIC FLIGHTS

(Continued from page 134A)

roomy cabins. Above 20,000 feet it is really uncomfortable without air-conditioning equipment, and that takes up a lot of valuable space and diminishes passenger comfort. The 'Atlantic Clipper' will have a cruising speed of 150 to 200 miles an hour, which is fast enough to attract trans-oceanic customers.

"Looking at the present situation of aviation," he continued, "I see no technical barriers in the way of a regular trans-Atlantic service. We have enough experience, equipment and trained mechanics to keep the line running on time all year round."

Turning to the possibilities of stratosphere flying, the designer said he could not foresee a great commercial development of aviation at that altitude. He believes that the stratosphere has military advantages which could be developed and that the stratosphere might be useful in transporting very urgent mail over long distances, but for passenger travel, the high cost and discomfort would make the stratosphere impractical.

"After all," he said, "the earth is pretty small when you calculate its size in terms of an airplane. At 200 miles per hour, one can cross the Atlantic ocean in about fifteen hours—from dawn to sunset. Cruising speeds in excess of 200 miles per hour are, therefore, not advisable for ocean transports, in my opinion."

He holds that aluminum magnesium alloys will remain the standard materials for plane construction. And as things are now, the internal combustion engine is here to stay for a while, "Although I believe," he continued, "that some sort of cheap safety fuel will be worked out and engines adapted for its use."

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D1329

See later pages

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**NEW GAP-BED LATHES**

Afford 45% extra capacity. No extra cost.  
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Toledo, Ohio

## 600 POWER MICROSCOPE \$8.50

Triple Objective Brownscope "Professional"

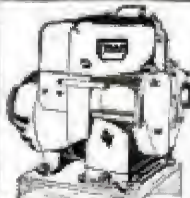


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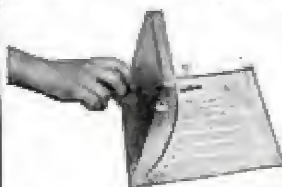
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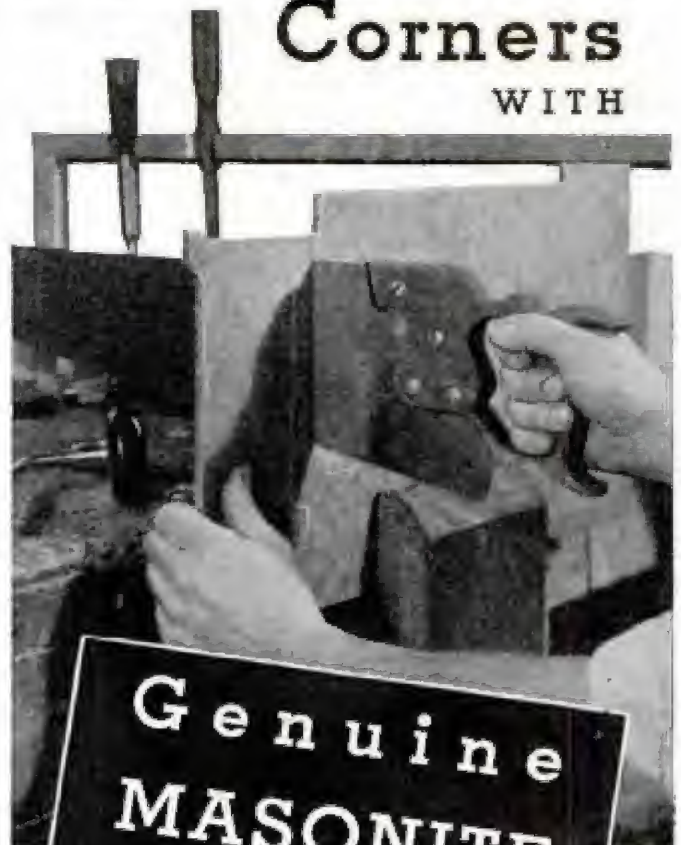


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## COMET ON RAILS BRINGS AIR SPEED TO EARTH

(Continued from page 116A)

aviation was a non-stop coast-to-coast crossing. It was finally made, on May 31, 1923, by two army flyers, Lieutenants Macready and Kelly, who covered the 2,700 miles in twenty-seven hours and fifty minutes. The United Air Lines now carries travelers from coast to coast between noon and breakfast the next morning. TWA planes depart from New York at 4:00 p.m. and arrive at Los Angeles at 7:00 a.m., the following morning.

The Union Pacific streamliner, with a single trip, lopped nineteen hours and forty-five minutes from the regular train time between Los Angeles and Chicago.

Oddly enough, the coast-to-coast steam train record is of long standing, having been made in 1906 by the late E. H. Harri-man, then chairman of the board of the Union Pacific, who sped across the country in seventy-one hours and twenty-seven minutes.

The end of bringing east even nearer to the west is not yet in sight, however. The present world speed record, 440 miles per hour, is held by Lieutenant Francesco Agello, of the Italian Speed School. With an engine rated at 3,500 horsepower, he piloted his seaplane at a speed of more than seven miles per minute. But even this is not considered final, since he is working for a speed of 600 miles per hour.

The Burlington's and Union Pacific's streamliners have smashed all the long-standing records of steam railroads. Already the Union Pacific has projected a nine-car train. The present six-car train has attained a trial speed of 120 miles an hour, while the trains to come may do even better. In less time than we anticipate, the new featherweight streamliners will open up sections of this country which have remained relatively remote.

The amazing fact about the streamliners is that the cruising range is about ten times that of a steam train. The latter must stop for fuel and water every 100 miles, but the streamliner can keep going for 1,000 miles without a stop!

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Complete with compound slide-rest, chucking device, 6" swing, 24" length overall, weighs 25 lbs. Extra bed-length, 30" foot; attachments for wood-turning, milling, grinding, sawing, drilling, etc., at low prices. Send \$1, shipped C.O.D. in U. S.; balance plus express charges. **FREE, 66-page "American Homecrafters' Manual" with each machine.** Send the stamp on this for sample copy "A MILLER-CAN HOME-CRAFTER" our how-to-make-it publication, and complete catalog of all machines, including the "American Junior" complete line of power tools at \$2.50 each (jubil press, wood lathe, bench saw, shaper, table scroll saw, disc sander)—you can have a COMPLETE SHOP for only a few dollars.

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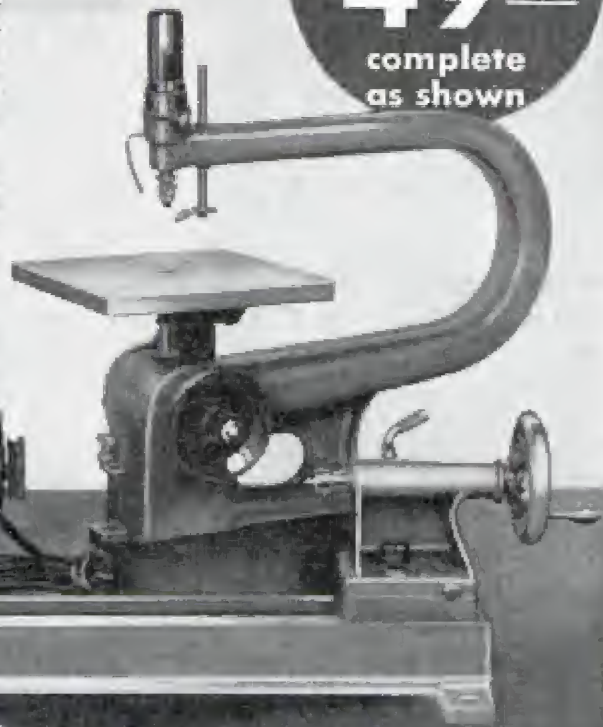
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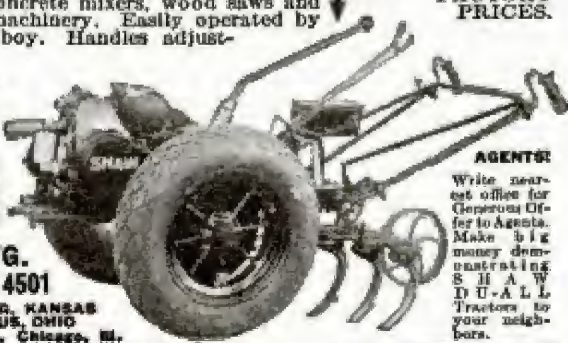
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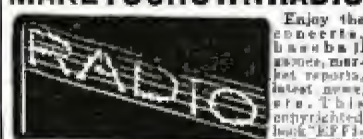
This book will teach you in a few hours—at home—in private—how to figure out as well as modern dances—the Fox Trot Steps, the Tango, the Collegiate Dances, the Waltz, the Quickstep, the Two-Step, etc., etc.

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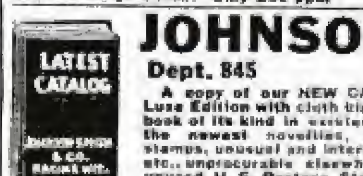
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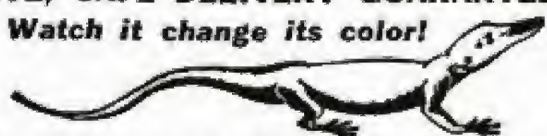
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Back-Geared, Screw-Cutting  
"Workshop"  
Bench Lathe  
less motor drive

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You can buy this South Bend Lathe Direct from the factory for only **\$19 Down**  
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THE new 9 $\frac{1}{2}$ " swing by 3' bed Workshop Bench Lathe turns, faces, bores, cuts threads and performs all kinds of machining operations on cast iron, steel, all soft metals, wood, compositions and other materials. Has the power to reduce the diameter of a steel shaft  $\frac{1}{8}$ " in one cut. Takes 18" between centers; weighs 300 lbs. Constructed entirely of cast iron and steel. It is a rigid, powerful, accurate, modern lathe.

Weight  
300 lbs.

**FEATURES** include back-geared headstock with six spindle speeds; cuts threads 4 to 40 per inch; has automatic longitudinal feed to carriage as fine as .00350 per inch; graduated compound rest;  $\frac{3}{4}$ -in. hole through spindle; three V-ways, one flat way on bed; all gears machine cut of steel and cast iron. It is a genuine South Bend Lathe, accurately built and recommended for the most accurate work.

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Any size or bed length South Bend Lathe from 9" swing to 18" swing priced from \$75 to \$1500 may be purchased on the Easy Payment Plan. One small down payment puts the lathe to work in your own shop so you can meet the monthly payments with the earnings. If you are interested in any size or type of lathe, write to us and we will send you an itemized quotation showing the cash price, the down payment, the monthly payment and the number of months to pay. This will put you under no obligation to us whatever. You can then decide whether or not you wish to purchase.

Why look for a second-hand lathe when you can buy any size or type new guaranteed South Bend Lathe on the Easy Payment Plan, by making a small down pay-

### SOUTH BEND LATHE WORKS

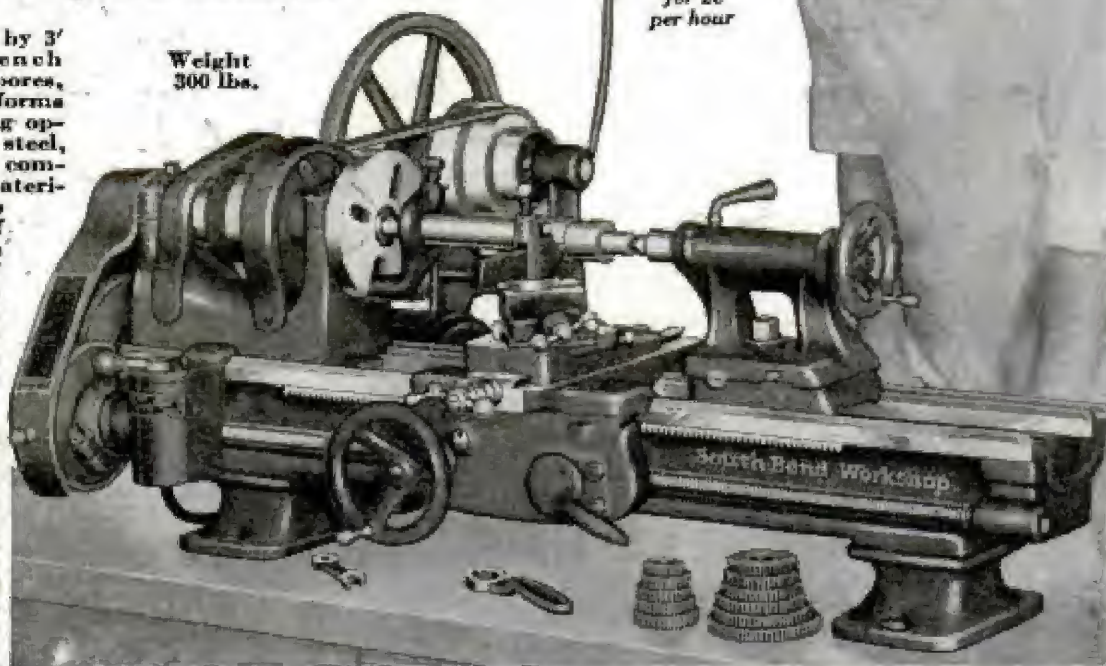
601 E. Madison St., South Bend, Ind., U.S.A.

Please send me quotation and illustration on the following lathe:

Swing.....Length of bed.....  
Countershaft Drive.....Motor Drive.....  
My work is.....  
Name.....  
Address.....  
City.....State.....



Operates from Lamp Socket for 2c per hour



9 $\frac{1}{2}$ " swing x 3' bed Workshop Bench Lathe with Horizontal Motor Drive complete with reversing motor and reversing switch as shown.....**\$94.00**  
\$24.00 Down, Balance \$7.00 a Month.

THE 9" Workshop Lathe is used by manufacturing plants, machine shops, government laboratories, schools and home shops. Automotive service shops use it for armature work, valve refacing, machining pistons, making bushings, etc. Send in your order now with down payment for 30-day trial in your own shop. Small monthly payments will take care of the balance. Immediate shipment in time for Christmas, if you wish.

ment with the order and paying the balance monthly. Listed below are a few popular sizes:

Size of Lathe	Weight Crated Lbs.	Price C'shaft Drive	Down Payment	Monthly Payment
9" x 3' "Toolmaker"	325	\$140.00	\$ 31.00	\$ 9.00
9" x 3' Junior	375	170.00	35.00	11.50
9" x 3' Std. Chge Gear	420	225.00	45.00	15.50
11" x 4' Std. Chge Gear	710	300.00	60.00	19.50
13" x 5' Std. Chge Gear	1090	352.00	75.00	25.00
16" x 6' Std. Chge Gear	1840	480.00	100.00	29.00
16" x 8' Std. Chge Gear	2000	520.00	107.50	30.50
18" x 8' Std. Chge Gear	2600	635.00	125.00	34.00

## Write for Free Bulletin 5-B

Get a copy of this valuable and instructive 32-page catalog illustrating, describing and pricing the 9" Workshop Lathe and all its accessories and attachments. If interested in a larger lathe, also ask for General Catalog No. 94. Mailed free postpaid, to any address.



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PORTABLE

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MONEY BACK GUARANTEE



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New wage scales in our own factories, and in the factories of the companies which make our materials, point definitely to higher prices. Stocks of machines on hand make possible the present unbelievably low cash price on this machine. Everything points to higher prices. We don't believe that we can maintain the present big price reduction in the face of constantly rising costs in every one of our departments. So we say "Act fast!"

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You can try this machine for 10 days without risking one penny of your money. *Not even shipping charges.* Send for complete details on this most liberal offer. Get attractive new catalogue illustrating and describing the many Remington models available on unusually low terms. Clip coupon today!

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If you want a gift for birthday, Christmas, or graduation...one that Father, Mother, Sister or Brother will use and appreciate for years to come...give a Remington Portable. It's the one gift that can be used with both pleasure and profit by every member of the family.

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Buying a typewriter isn't like buying a suit of clothes. Many Remington portables, seeing 10 years of hard service are still in active use. When you buy...buy a machine with every standard feature. The Remington No. 5 is the most compact and durable portable ever built...includes all essential standard typewriter features. This beautiful machine

represents the height of economy...unequalled economy in first cost...unequalled economy in service.

It is today the best value ever offered in typewriter history...and that statement comes from the company that has constantly made typewriter history. Buy now. It is a real bargain offer.

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The Model 5 includes every essential feature found in standard typewriters. It has standard 4-row keyboard. Complete visibility. Standard width carriage for long envelopes. Carriage return lever of exceptional design for easy and rapid operation.

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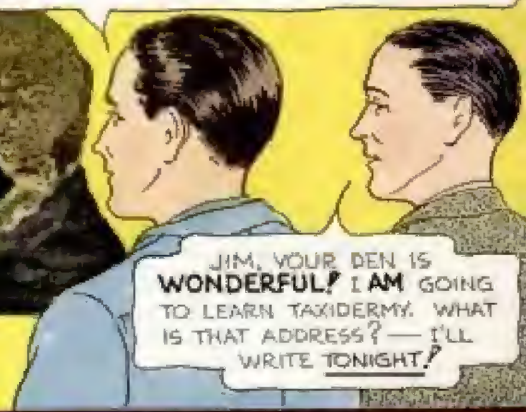


IT IS, ED, AND A MONEY-MAKER, TOO. — IN FACT MY WORKBENCH NOW PAYS ME A FINE PROFIT. I MOUNTED THIS FROG GROUP AS A WINDOW DISPLAY FOR A MERCHANT — THAT BRINGS MY SPARE TIME EARNINGS UP TO \$57 THIS MONTH.

BUT WASN'T IT HARD TO LEARN, JIM?



IT'S EASY, ONCE YOU GET THE HANG OF IT. I LEARNED RIGHT HERE AT HOME IN MY SPARE TIME FROM THE N.W. SCHOOL OF TAXIDERM. NOW I GET **TWICE** AS MUCH FUN FROM MY HUNTING AND FISHING AS I DID BEFORE I KNEW TAXIDERM. USEFUL ARTICLES, LIKE THAT QUAIL LAMP AND OWL AND SQUIRREL BOOK-ENDS, ARE GREAT FOR SPORTSMEN'S DENS—I'VE SOLD A BUNCH OF THEM. FOR THE MAN WITH A WORKBENCH, **TAXIDERM IS THE GRANDEST HOBBY IN THE WORLD!** WHY DON'T YOU TAKE IT UP, ED?



JIM, YOUR DEN IS **WONDERFUL!** I AM GOING TO LEARN TAXIDERM. WHAT IS THAT ADDRESS? — I'LL WRITE TONIGHT!

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